

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



BANDERA COUNTY, TEXAS

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
BANDERA, CITY OF	480021
BANDERA COUNTY, UNINCORPORATED AREAS	480020



FEMA

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FLOOD INSURANCE STUDY NUMBER
48019CV000B

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TABLE OF CONTENTS

Volume 1

	<u>Page</u>
SECTION 1.0 – INTRODUCTION	1
1.1 The National Flood Insurance Program	1
1.2 Purpose of this Flood Insurance Study Report	2
1.3 Jurisdictions Included in the Flood Insurance Study Project	2
1.4 Considerations for using this Flood Insurance Study Report	3
 SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS	 13
2.1 Floodplain Boundaries	13
2.2 Floodways	30
2.3 Base Flood Elevations	31
2.4 Non-Encroachment Zones	31
2.5 Coastal Flood Hazard Areas	31
2.5.1 Water Elevations and the Effects of Waves	31
2.5.2 Floodplain Boundaries and BFEs for Coastal Areas	31
2.5.3 Coastal High Hazard Areas	32
2.5.4 Limit of Moderate Wave Action	32
 SECTION 3.0 – INSURANCE APPLICATIONS	 32
3.1 National Flood Insurance Program Insurance Zones	32
 SECTION 4.0 – AREA STUDIED	 33
4.1 Basin Description	33
4.2 Principal Flood Problems	33
4.3 Non-Levee Flood Protection Measures	34
4.4 Levees	34
 SECTION 5.0 – ENGINEERING METHODS	 35
5.1 Hydrologic Analyses	35
5.2 Hydraulic Analyses	40
5.3 Coastal Analyses	56
5.3.1 Total Stillwater Elevations	56
5.3.2 Waves	56
5.3.3 Coastal Erosion	56
5.3.4 Wave Hazard Analyses	56
5.4 Alluvial Fan Analyses	56
 SECTION 6.0 – MAPPING METHODS	 57
6.1 Vertical and Horizontal Control	57
6.2 Base Map	59
6.3 Floodplain and Floodway Delineation	59
6.4 Coastal Flood Hazard Mapping	63
6.5 FIRM Revisions	63
6.5.1 Letters of Map Amendment	63

6.5.2	Letters of Map Revision Based on Fill	64
6.5.3	Letters of Map Revision	64
6.5.4	Physical Map Revisions	64
6.5.5	Contracted Restudies	65
6.5.6	Community Map History	65
SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION		66
7.1	Contracted Studies	66
7.2	Community Meetings	76
SECTION 8.0 – ADDITIONAL INFORMATION		78
SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES		79

Figures

	<u>Page</u>
Figure 1: FIRM Index	5
Figure 2: FIRM Notes to Users	6
Figure 3: Map Legend for FIRM	9
Figure 4: Floodway Schematic	30
Figure 5: Wave Runup Transect Schematic	31
Figure 6: Coastal Transect Schematic	32
Figure 7: Frequency Discharge-Drainage Area Curves	39
Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas	56
Figure 9: Transect Location Map	56

Tables

	<u>Page</u>
Table 1: Listing of NFIP Jurisdictions	2
Table 2: Flooding Sources Included in this FIS Report	15
Table 3: Flood Zone Designations by Community	32
Table 4: Basin Characteristics	33
Table 5: Principal Flood Problems	33
Table 6: Historic Flooding Elevations	34
Table 7: Non-Levee Flood Protection Measures	34
Table 8: Levees	34
Table 9: Summary of Discharges	37
Table 10: Summary of Non-Coastal Stillwater Elevations	39
Table 11: Stream Gage Information used to Determine Discharges	40
Table 12: Summary of Hydrologic and Hydraulic Analyses	41
Table 13: Roughness Coefficients	56
Table 14: Summary of Coastal Analyses	56
Table 15: Tide Gage Analysis Specifics	56
Table 16: Coastal Transect Parameters	56

Table 17: Summary of Alluvial Fan Analyses	57
Table 18: Results of Alluvial Fan Analyses	57
Table 19: Countywide Vertical Datum Conversion	57
Table 20: Stream-Based Vertical Datum Conversion	59
Table 21: Base Map Sources	59
Table 22: Summary of Topographic Elevation Data used in Mapping	60
Table 23: Floodway Data	62
Table 24: Flood Hazard and Non-Encroachment Data for Selected Streams	63
Table 25: Summary of Coastal Transect Mapping Considerations	63
Table 26: Incorporated Letters of Map Change	64
Table 27: Community Map History	66
Table 28: Summary of Contracted Studies Included in this FIS Report	66
Table 29: Community Meetings	77
Table 30: Map Repositories	78
Table 31: Additional Information	78
Table 32: Bibliography and References	80

Volume 1
Exhibits

Flood Profiles	<u>Panel</u>
Medina River	01-05 P
Medina River (Bandera)	06-11 P
Mud Creek	12 P
San Julian Creek	13 P
Unnamed Split Reach to Medina River	14 P
Unnamed Tributary 1 to Medina River	15 P
Unnamed Tributary 2 to Medina River	16 P
Unnamed Tributary 1 to San Julian Creek	17 P
Unnamed Tributary 1 to Unnamed Split Reach to Medina River	18 P
Unnamed Tributary 2 to Unnamed Split Reach to Medina River	19 P

Published Separately

Flood Insurance Rate Map (FIRM)

FLOOD INSURANCE STUDY REPORT BANDERA COUNTY, TEXAS AND INCORPORATED AREAS

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60, *Criteria for Land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal

Government. Congress also recognized that most of these floodprone buildings were built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as "Post-FIRM" buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community's regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of Bandera County, Texas.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the United States Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC-8) sub-basins affecting each, are shown in Table 1. The FIRM panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Bandera, City of	480021	12100302	48019C0377F 48019C0379F 48019C0381F	

Table 1: Listing of NFIP Jurisdictions, continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Bandera County, Unincorporated Areas	480020	12110106, 12100302, 12110107, 12100304, 12100201	48019C0025F 48019C0050F 48019C0075F 48019C0100F 48019C0125F 48019C0150F 48019C0175F 48019C0200F 48019C0225F 48019C0250F 48019C0275F 48019C0300E 48019C0325F 48019C0350F 48019C0375F 48019C0376F 48019C0377F 48019C0378F 48019C0379F 48019C0381F 48019C0385F 48019C0390F 48019C0395F 48019C0405F 48019C0410F 48019C0415F 48019C0420F 48019C0450F 48019C0475E 48019C0500F 48019C0505F 48019C0510F 48019C0515F 48019C0520F 48019C0550E ¹	

¹ Panel Not Printed

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1% annual chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1% annual chance and 0.2% annual chance floodplains; and 1% annual chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 30, "Map Repositories," within this FIS Report.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

The initial Countywide FIS Report for Bandera County became effective on February 4, 2011. Refer to Table 27 for information about subsequent revisions to the FIRMs.

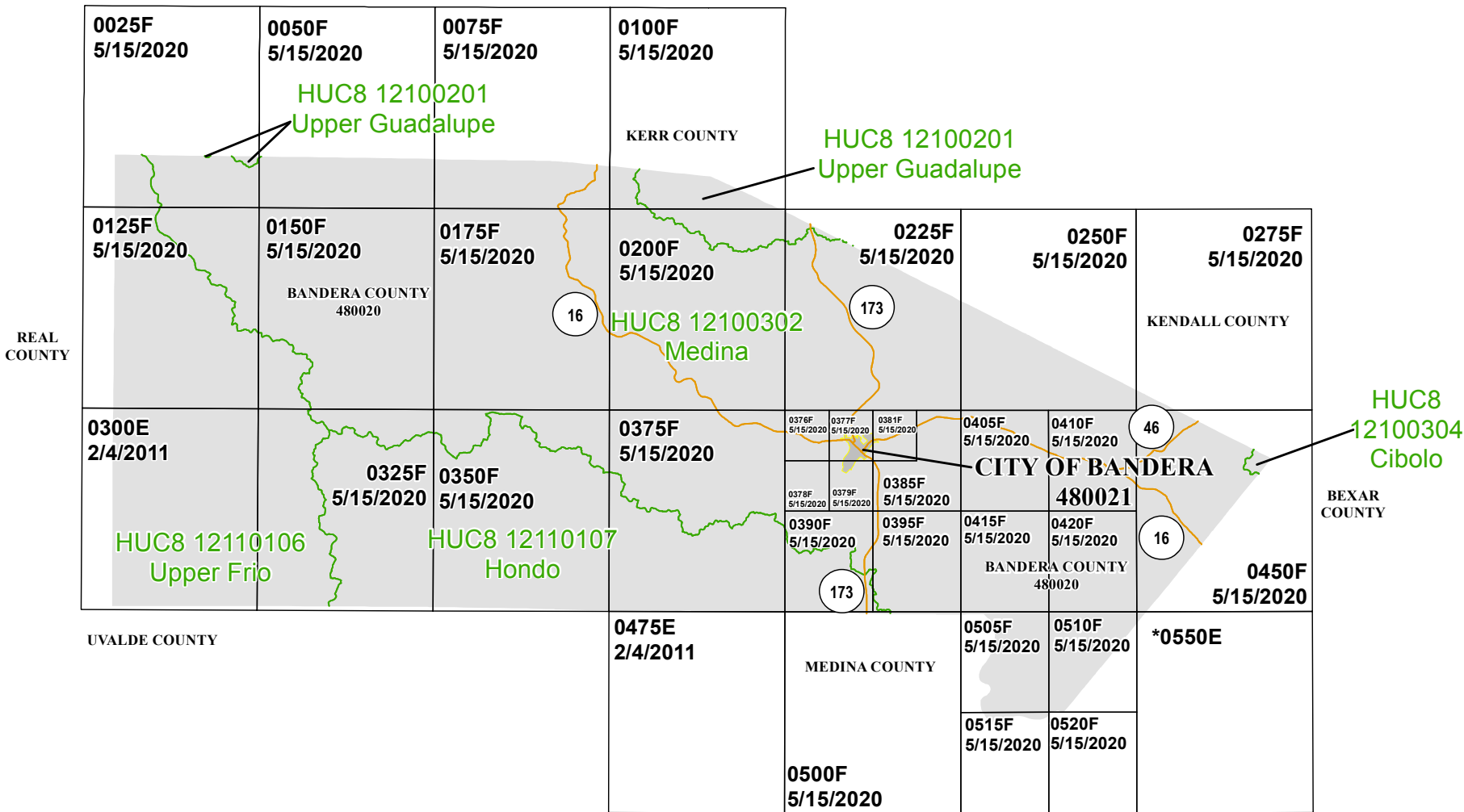
- Selected FIRM panels for the community may contain information (such as floodways and cross sections) that was previously shown separately on the corresponding Flood Boundary and Floodway Map (FBFM) panels. In addition, former flood hazard zone designations have been changed as follows:

<u>Old Zone</u>	<u>New Zone</u>
A1 through A30	AE
B	X (shaded)
C	X (unshaded)

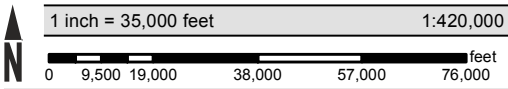
- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at www.fema.gov/online-tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Bandera County, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, major roads, watershed boundaries, and USGS HUC-8 codes.

Figure 1: FIRM Index



ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before May 15, 2020.

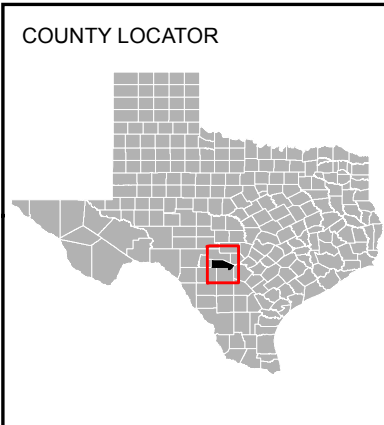


Map Projection:
State Plane Lambert Conformal Conic, Texas South Central
Zone FIPS 4204; North American Datum 1983; Western
Hemisphere; Vertical Datum: NAVD 88

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
[HTTPS://MSC.FEMA.GOV](https://MSC.FEMA.GOV)

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

* PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

BANDERA COUNTY, TEXAS and Incorporated Areas

PANELS PRINTED:

0025, 0050, 0075, 0100, 0125, 0150, 0175, 0200, 0225, 0250, 0275,
0300, 0325, 0350, 0375, 0376, 0377, 0378, 0379, 0381, 0385, 0390,
0395, 0405, 0410, 0415, 0420, 0450, 0475, 0500, 0505, 0510, 0515,
0520



MAP NUMBER
48019CIND08

MAP REVISED
MAY 15, 2020

Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

<div><h2>NOTES TO USERS</h2><p>For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Map Information eXchange.</p><p>Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.</p><p>For community and countywide map dates, refer to Table 27 in this FIS Report.</p><p>To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.</p></div>
<div><p>The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.</p><p>BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.</p><p>FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.</p><p>FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.</p></div>

Figure 2. FIRM Notes to Users, continued

PROJECTION INFORMATION: The projection used in the preparation of the map was State Plane Lambert Conformal Conic, Texas South Central Zone FIPS 4204. The horizontal datum was the North American Datum of 1983 NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 30 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on this FIRM was derived from digital data obtained from Bandera County dated July 2018 and the National Flood Hazard Layer (NFHL) dated 2011.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Bandera County, Texas, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 27 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before May 15, 2020.

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for Bandera County, Texas, effective May 15, 2020.

Figure 2. FIRM Notes to Users, continued

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Bandera County.

Figure 3: Map Legend for FIRM

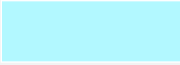
<p>SPECIAL FLOOD HAZARD AREAS: <i>The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.</i></p>	
	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.

Figure 3: Map Legend for FIRM, continued






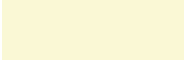

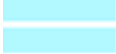






	Regulatory Floodway determined in Zone AE.
OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.
	Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood.
	Area with Flood Risk due to Levee: Areas where a non-accredited levee, dike, or other flood control structure is shown as providing protection to less than the 1% annual chance flood.
OTHER AREAS	
	Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.
	Unshaded Zone X: Areas of minimal flood hazard.
FLOOD HAZARD AND OTHER BOUNDARY LINES	
  (ortho) (vector)	Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)
	Limit of Study
	Jurisdiction Boundary
	Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet
GENERAL STRUCTURES	
 <i>Aqueduct</i> <i>Channel</i> <i>Culvert</i> <i>Storm Sewer</i>	Channel, Culvert, Aqueduct, or Storm Sewer
 <i>Dam</i> <i>Jetty</i> <i>Weir</i>	Dam, Jetty, Weir

Figure 3: Map Legend for FIRM, continued




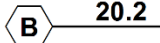

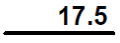
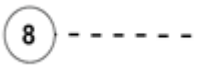









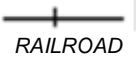



	Levee, Dike, or Floodwall
 <i>Bridge</i>	Bridge
REFERENCE MARKERS	
	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
	River, Stream or Other Hydrographic Feature
	Interstate Highway
	U.S. Highway
	State Highway

Figure 3: Map Legend for FIRM, continued

	County Highway
	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
	Railroad
	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
⁴² 76 ^{000m} E	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16' 52.5"	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1% annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2% annual chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and Bandera County as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1% annual chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 22), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1% and 0.2% annual chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1% annual chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary is shown on the FIRM. Figure 3, “Map Legend for FIRM”, describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within Bandera County, respectively.

Table 2, “Flooding Sources Included in this FIS Report,” lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 12. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1% annual chance floodplain corresponds to the SFHAs. The 0.2% annual chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic

data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Bandera Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	22.1		N	A	April 2017
Barnes Branch and Zone A Tributaries	Bandera County, Unincorporated Areas	At the confluence with Bruins Creek	N/A	12100302	5.80		N	A	April 2017
Barnett Creek	Bandera County, Unincorporated Areas	At the confluence with Seco Creek	Approximately 0.37 miles upstream of the confluence with Seco Creek	12110107	0.37		N	A	January 1988
Bauerlein Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	3.82		N	A	April 2017
Bear Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	6.44		N	A	April 2017
Bear Spring Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	6.25		N	A	April 2017
Beekman Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	2.08		N	A	April 2017
Benton Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	4.86		N	A	April 2017
Big Armidge Creek	Bandera County, Unincorporated Areas	At the confluence with Ranger Creek	Approximately 1.08 miles upstream of North Prong Road	12100302	1.08		N	A	April 2017

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Blackjack Hollow and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110106	4.42		N	A	January 1988
Bravo Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110106	5.90		N	A	January 1988
Brewington Creek	Bandera County, Unincorporated Areas	At the confluence with Medina River	At the Bandera/Kerr County boundary	12100302	6.02		N	A	April 2017
Bruins Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	12.59		N	A	April 2017
Brushy Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110106	3.62		N	A	January 1988
Buck Hollow and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12110107	1.74		N	A	January 1988
Buckelew Creek	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 2.69 miles upstream of the confluence with Medina River	12100302	2.69		N	A	April 2017
Can Creek	Bandera County, Unincorporated Areas	At the confluence with Sabinal River	Approximately 0.06 miles upstream of the confluence with Sabinal River	12110106	0.06		N	A	January 1988

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Carpenter Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 3.14 miles upstream of the confluence with West Prong Medina River	12100302	3.14		N	A	April 2017
Cazey Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 3.90 miles upstream of the confluence with West Prong Medina River	12100302	3.90		N	A	April 2017
Chalk Creek	Bandera County, Unincorporated Areas	At the confluence with Wallace Creek	Approximately 2.84 miles upstream of ST HWY 16 N	12100302	2.84		N	A	April 2017
Clark Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 3.27 miles upstream of FM 337 E	12100302	3.27		N	A	April 2017
Cloud Hollow River	Bandera County, Unincorporated Areas	At the confluence with Privilege Creek	At the Bandera/Kerr County boundary	12100302	2.83		N	A	April 2017
Coal Creek 1	Bandera County, Unincorporated Areas	At the confluence with Ranger Creek	Approximately 2.26 miles upstream of the confluence with Ranger Creek	12100302	2.26		N	A	April 2017
Coal Creek 2	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 1.32 miles upstream of the confluence with Medina River	12100302	1.32		N	A	April 2017

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Coalkin Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 3.39 miles upstream of West Prong Medina River	12100302	3.39		N	A	April 2017
Commissioners Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	2.54		N	A	January 1988
Cow Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	4.46		N	A	January 1988
Cypress Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	5.61		N	A	April 2017
Dockery Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 0.48 miles upstream of the confluence with West Prong Medina River	12100302	0.48		N	A	April 2017
Doe Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	7.01		N	A	April 2017
Dry Hollow Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	11.79		N	A	April 2017
Duncan Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 1.26 miles upstream of FM 337 E	12100302	1.26		N	A	April 2017
East Verde Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	6.90		N	A	January 1988

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Elam Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 4.3 miles upstream of FM 337 E	12100302	4.62		N	A	April 2017
Elm Creek 1	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 3.48 miles upstream of the confluence with West Prong Medina River	12100302	3.48		N	A	April 2017
Elm Creek 3 and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	24.46		N	A	April 2017
Hay Hollow	Bandera County, Unincorporated Areas	At the confluence with Seco Creek	Approximately 0.55 miles upstream of the confluence with Seco Creek	12110107	0.55		N	A	January 1988
Hicks Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	12.07		N	A	April 2017
Hondo Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	12.05		N	A	January 1988
Honey Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	7.90		N	A	April 2017
Horse Creek	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 3.9 miles upstream of Horse Creek Road	12100302	4.02		N	A	April 2017
Hough Creek	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 0.35 miles upstream of ST HWY 16 N	12100302	0.84		N	A	April 2017

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Indian Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	10.10		N	A	April 2017
Jackson Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 3.14 miles upstream of the confluence with West Prong Medina River	12100302	3.14		N	A	April 2017
Jernigan Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110106	4.13		N	A	January 1988
Johnson Creek	Bandera County, Unincorporated Areas	At the confluence with Wallace Creek	Approximately 0.25 miles upstream of the confluence with Wallace Creek	12100302	0.25		N	A	April 2017
Laxson Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	9.33		N	A	April 2017
Left Hand Horse Creek	Bandera County, Unincorporated Areas	At the confluence with Horse Creek	Approximately 0.65 miles upstream of the confluence with Horse Creek	12100302	0.65		N	A	April 2017
Little Brewington Creek	Bandera County, Unincorporated Areas	At the confluence with Brewington Creek	At the Bandera/Kerr County boundary	12100302	1.42		N	A	April 2017
Little Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110106	21.99		N	A	January 1988

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Little Mason Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	3.20		N	A	April 2017
Little Rocky Creek	Bandera County, Unincorporated Areas	At the confluence with Rocky Creek 1	At the Bandera/Kerr County boundary	12100302	1.62		N	A	April 2017
Love Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 3.1 miles upstream of FM 337 E	12100302	3.37		N	A	April 2017
Madrona Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	8.03		N	A	April 2017
Marler Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110106	1.80		N	A	January 1988
Mason Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	13.38		N	A	April 2017
Medina Lake	Bandera County, Unincorporated Areas	At the Bandera/Medina County boundary	Approximately 11.5 miles upstream of the Bandera/Medina County boundary	12100302		4.2	N	AE	June 2012
Medina River (Bandera)	Bandera, City of; Bandera County, Unincorporated Areas	Approximately 3.5 miles downstream of ST HWY 173 S	Approximately 2.8 miles downstream of FM 470	12100302	7.0		Y	AE	April 2017
Medina River	Bandera County, Unincorporated Areas	Approximately 2.8 miles downstream of FM 470	Approximately 0.93 miles upstream of Station C Road	12100302	51		N	A	April 2017

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Medina River	Bandera County, Unincorporated Areas	Approximately 11.5 miles upstream of the Bandera/Medina County boundary	Approximately 3.3 miles upstream of English Crossing Road	12100302	6.5		N	A	April 2017
Medina River	Bandera County, Unincorporated Areas	Approximately 3.3 miles upstream of English Crossing Road	Approximately 3.5 miles downstream of ST HWY 173 S	12100302	5.4		N	AE	January 1988
Medina River Zone A Tributaries	Bandera, City of; Bandera County, Unincorporated Areas	N/A	N/A	12100302	85.45		N	A	April 2017
Mescal Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	9.71		N	A	April 2017
Mickle Creek	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 2.78 miles upstream of the confluence with Medina River	12100302	2.78		N	A	April 2017
Middle Prong Jernigan Creek	Bandera County, Unincorporated Areas	At the confluence with Jernigan Creek	Approximately 0.15 miles upstream of the confluence with Jernigan Creek	12110106	0.15		N	A	January 1988
Middle Verde Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	5.08		N	A	January 1988
Mill Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12110106	0.40		N	A	January 1988

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Mud Creek	Bandera County, Unincorporated Areas	At Mulberry Street	Approximately 0.91 miles upstream of Scooters Lane	12100302	2.6		N	A	April 2017
Mud Creek	Bandera, City of; Bandera County, Unincorporated Areas	At the confluence with Medina River	At Mulberry Street	12100302	0.71		N	AE	January 1988
Myrtle Creek	Bandera County, Unincorporated Areas	At the confluence with Bandera Creek	Approximately 0.99 miles upstream of FM 2828	12100302	5.62		N	A	April 2017
North Prong Jernigan Creek	Bandera County, Unincorporated Areas	At the confluence with Jernigan Creek	Approximately 0.25 miles upstream of the confluence with Jernigan Creek	12110106	0.25		N	A	January 1988
Pecan Creek	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 1.8 miles upstream of FM 2107	12100302	1.92		N	A	April 2017
Pigeon Roost Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	2.32		N	A	January 1988
Pipe Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	10.16		N	A	April 2017
Privilege Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	14.70		N	A	April 2017
Pugmore Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	5.49		N	A	April 2017

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Ranger Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	12.73		N	A	April 2017
Red Bluff Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	42.49		N	A	April 2017
Rhyne Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	3.44		N	A	April 2017
Robinson Creek	Bandera County, Unincorporated Areas	At the confluence with Wallace Creek	Approximately 3.37 miles upstream of the confluence with Wallace Creek	12100302	3.37		N	A	April 2017
Rocky Creek 1	Bandera County, Unincorporated Areas	At the confluence with Medina River	At the Bandera/Kerr County boundary	12100302	5.35		N	A	April 2017
Rocky Creek 2 and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	9.08		N	A	April 2017
Sabinal River and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110106	36.37		N	A	January 1988
San Geronimo Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	1.6		N	A	January 1988
San Julian Creek	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 0.55 miles upstream of the confluence with Medina River	12100302	0.55		N	AE	November 2017

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
San Julian Creek	Bandera County, Unincorporated Areas	Approximately 0.55 miles upstream of the confluence with Medina River	Approximately 1.3 miles upstream of FM 1077	12100302	26.08		N	A	April 2017
San Julian Creek Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	27.92		N	A	April 2017
Schladoer Creek	Bandera County, Unincorporated Areas	At the confluence with Seco Creek	Approximately 0.38 miles upstream of the confluence with Seco Creek	12110107	0.38		N	A	January 1988
Seco Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	14.88		N	A	January 1988
Shephard Creek	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 2.11 miles upstream of North Prong Road	12100302	2.11		N	A	April 2017
Snow Creek	Bandera County, Unincorporated Areas	At the confluence with Sabinal River	Approximately 0.37 miles upstream of the confluence with Sabinal River	12110106	0.37		N	A	January 1988
South Fork, San Geronimo Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	1.3		N	A	January 1988
Spires Creek 1 and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	3.79		N	A	April 2017

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Spires Creek 2 and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	4.07		N	A	April 2017
Spring Branch and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110106	4.1		N	A	January 1988
Spring Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 1.36 miles upstream of the confluence with West Prong Medina River	12100302	1.36		N	A	April 2017
Spring Creek	Bandera County, Unincorporated Areas	At the confluence with Hondo Creek	Approximately 0.37 miles upstream of the confluence with Hondo Creek	12110107	0.37		N	A	January 1988
Stanford Creek	Bandera County, Unincorporated Areas	At the confluence with West Prong Medina River	Approximately 0.41 miles upstream of FM 337 E	12100302	1.27		N	A	April 2017
Swift Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12110107	1.89		N	A	January 1988
Thomas Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	2.78		N	A	January 1988
Unnamed Split Reach to Medina River	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 1.1 miles upstream of the confluence with Medina River	12100302	1.15		N	AE	January 1988

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Unnamed Tributary 1 to Medina River	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 0.35 miles upstream of the confluence with Medina River	12100302	0.35		N	AE	January 1988
Unnamed Tributary 1 to San Julian Creek	Bandera County, Unincorporated Areas	At the confluence with San Julian Creek	Approximately 1.03 miles upstream of the confluence with San Julian Creek	12100302	1.03		N	AE	January 1988
Unnamed Tributary 1 to Unnamed Split Reach to Medina River	Bandera County, Unincorporated Areas	At the confluence with Unnamed Split Reach to Medina River	Approximately 0.28 miles upstream of the confluence with Unnamed Split Reach to Medina River	12100302	0.28		N	AE	January 1988
Unnamed Tributary 2 to Medina River	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 0.49 miles upstream of the confluence with Medina River	12100302	0.49		N	AE	January 1988
Unnamed Tributary 2 to Unnamed Split Reach to Medina River	Bandera County, Unincorporated Areas	At the confluence with Medina River	Approximately 0.44 miles upstream of the confluence with Medina River	12100302	0.44		N	AE	January 1988
Walker Creek and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	3.47		N	A	April 2017
Wallace Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	6.08		N	A	April 2017

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Wedgeworth Creek	Bandera County, Unincorporated Areas	At the confluence with Sabinal River	Approximately 0.08 miles upstream of the confluence with Sabinal River	12110106	0.08		N	A	January 1988
West Prong Medina River and Zone A Tributary	Bandera County, Unincorporated Areas	N/A	N/A	12100302	16.55		N	A	April 2017
West Sabinal River and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110106	13.62		N	A	January 1988
West Seco Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	4.19		N	A	January 1988
West Verde Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	7.96		N	A	January 1988
Williams Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	9.48		N	A	January 1988
Winans Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12100302	13.19		N	A	April 2017
Wolf Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	5.87		N	A	January 1988
Wright Creek and Zone A Tributaries	Bandera County, Unincorporated Areas	N/A	N/A	12110107	3.25		N	A	January 1988

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Wyatt Creek	Bandera County, Unincorporated Areas	At the confluence with Ranger Creek	Approximately 2.3 miles upstream of the confluence with Ranger Creek	12100302	2.33		N	A	April 2017

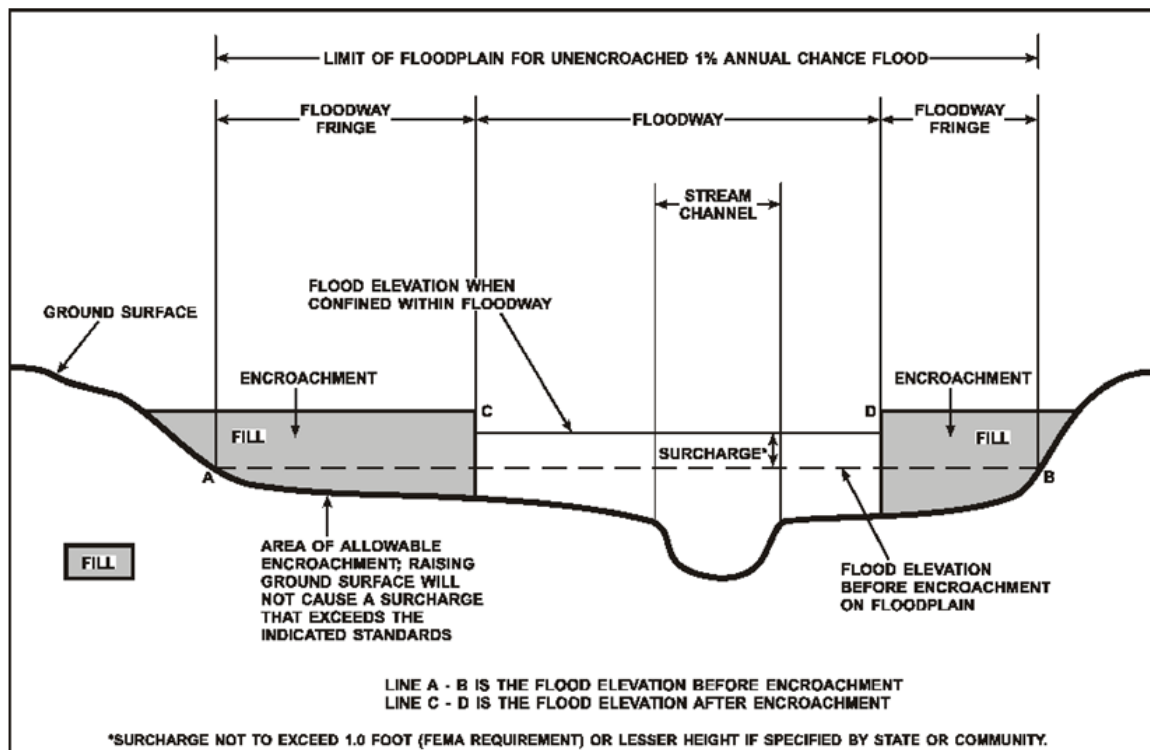
2.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard.

For purposes of the NFIP, a floodway is used as a tool to assist local communities in balancing floodplain development against increasing flood hazard. With this approach, the area of the 1% annual chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1% annual chance flood. The floodway fringe is the area between the floodway and the 1% annual chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1% annual chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 23, "Floodway Data."

All floodways that were developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. In cases where the floodway and 1% annual chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. BFEs are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM.

2.4 Non-Encroachment Zones

This section is not applicable to this Flood Risk Project.

2.5 Coastal Flood Hazard Areas

This section is not applicable to this Flood Risk Project.

2.5.1 Water Elevations and the Effects of Waves

This section is not applicable to this Flood Risk Project.

Figure 5: Wave Runup Transect Schematic [Not Applicable to this Flood Risk Project]

2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

This section is not applicable to this Flood Risk Project.

2.5.3 Coastal High Hazard Areas

This section is not applicable to this Flood Risk Project.

Figure 6: Coastal Transect Schematic
[Not Applicable to this Flood Risk Project]

2.5.4 Limit of Moderate Wave Action

This section is not applicable to this Flood Risk Project.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, “Map Legend for FIRM.” Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1% annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2% annual chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in Bandera County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Bandera, City of	A, AE, X
Bandera County, Unincorporated Areas	A, AE, X

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 4 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its drainage area.

Table 4: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Upper Guadalupe	12100201	Guadalupe River	Drains a minimum area of north central Bandera County	1,433
Medina	12100302	Medina River	Largest watershed within Bandera County, encompassing the center of the county	1,348
Cibolo	12100304	Cibolo Creek	Drains the far east portion of Bandera County	854
Upper Frio	12110106	Frio River	Drains the western Bandera County	2,341
Hondo	12110107	Hondo Creek	Drains South central Bandera County	1,107

4.2 Principal Flood Problems

Table 5 contains a description of the principal flood problems that have been noted for Bandera County by flooding source.

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
Medina River	The Medina River and its major tributaries are the primary flood threat to Bandera due to the large drainage area above the city (approximately 330 square miles) and the high runoff potential. The City of Bandera has experienced several major floods from the Medina River. The earliest recorded large flood occurred in 1853, but there is insufficient data for an estimate of its recurrence interval. Floods also occurred in 1870, 1900, 1901, 1903, 1917, 1918, 1919, 1921, and 1936. Two low-water bridges crossing the Medina River within the city are overtopped regularly by high water. Traffic on State Routes 16 and 173 is interrupted periodically by floodwaters from the Medina River or its tributaries.
Dry Hollow Creek	Dry Hollow Creek is responsible for short-term local flooding.

Table 5: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Williams Creek	Presents flooding problems but because of a lack of population centers property damage is generally not excessive.
Seco Creek	Presents flooding problems but because of a lack of population centers property damage is generally not excessive.
Sabinal River	Presents flooding problems but because of a lack of population centers property damage is generally not excessive.

Table 6 contains information about historic flood elevations in the communities within Bandera County.

Table 6: Historic Flooding Elevations

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Medina River	City of Bandera	N/A	1978	500	Fort Worth District USACE

4.3 Non-Levee Flood Protection Measures

Table 7 contains information about non-levee flood protection measures within Bandera County such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 7: Non-Levee Flood Protection Measures

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Medina River	Unnamed	Channel Dam	Approximately 150 feet upstream of State Highway 173 South	A channel dam located within the City of Bandera

4.4 Levees

This section is not applicable to this Flood Risk Project.

Table 8: Levees

[Not Applicable to this Flood Risk Project]

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2% annual chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

In addition to these flood events, the “1-percent-plus”, or “1%+”, annual chance flood elevation has been modeled and included on the flood profile for certain flooding sources in this FIS Report. While not used for regulatory or insurance purposes, this flood event has been calculated to help illustrate the variability range that exists between the regulatory 1% annual chance flood elevation and a 1% annual chance elevation that has taken into account an additional amount of uncertainty in the flood discharges (thus, the 1% “plus”). For flooding sources whose discharges were estimated using regression equations, the 1%+ flood elevations are derived by taking the 1% annual chance flood discharges and increasing the modeled discharges by a percentage equal to the average predictive error for the regression equation. For flooding sources with gage- or rainfall-runoff-based discharge estimates, the upper 84-percent confidence limit of the discharges is used to compute the 1%+ flood elevations.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 26, “Incorporated Letters of Map Change”, which include Letters of Map Revision (LOMRs). For more information about LOMRs, refer to Section 6.5, “FIRM Revisions.”

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for

each stream is provided in Table 12. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 9. A summary of stillwater elevations developed for non-coastal flooding sources is provided in Table 10.

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Medina River	Downstream of the confluence with Priveledge Creek	465.8	52,005	*	130,404	177,153	*	326,010
Medina River	Upstream of the confluence with Priveledge Creek	419.7	48,349	*	121,236	164,698	*	303,090
Medina River	Downstream of the confluence with San Julian	415.90	48,042	*	120,467	163,653	*	301,167
Medina River	Downstream of the confluence of Bandera Creek	397.00	46,500	80,000	116,600	158,400	*	291,500
Medina River	Upstream of the confluence of Bandera Creek	330	42,300	*	106,000	144,000	*	265,000
Mud Creek	At the corporate limits with City of Bandera	2.1	*	*	*	2,800	*	*
San Julian Creek	Just upstream of the confluence with Medina River	14.2	*	*	*	12,574	*	*
Unnamed Split Reach to Medina River	Upstream of the confluence with Medina Creek	0.68	1,490	*	2,608	3,203	*	19,308

Table 9: Summary of Discharges, continued

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Unnamed Tributary 1 to San Julian Creek	Upstream of the confluence with San Julian Creek	0.35	762	*	991	1,145	*	*
Unnamed Tributary 2 to Unnamed Split Reach to Medina River	Upstream of the confluence with Unnamed Split Reach to Medina River	0.23	564	*	891	1,073	*	1,728
Unnamed Tributary 1 to Unnamed Split Reach to Medina River	Upstream of the confluence with Unnamed Split Reach to Medina River	0.10	192	*	302	363	*	586
Unnamed Tributary 1 to Medina River	Upstream of the confluence with Medina Creek	0.17	372	*	585	703	*	1,132
Unnamed Tributary 2 to Medina River	Upstream of the confluence with Medina Creek	0.58	501	*	854	1,057	*	2,136
Inflow into Unnamed Pond		0.47	767	*	1,213	1,462	*	2,364
Outflow out of Unnamed Pond		0.5	453	*	775	960	*	1,944

*Not calculated for this Flood Risk Project

Figure 7: Frequency Discharge-Drainage Area Curves
[Not Applicable to this Flood Risk Project]

Table 10: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD88)				
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Medina Lake	Bandera County, Unincorporated Areas	1,065.6	*	1,070.9	1,073.3	*

*Not calculated for this Flood Risk Project

Table 11: Stream Gage Information used to Determine Discharges
[Not Applicable to this Flood Risk Project]

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed in Table 23, "Floodway Data."

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 12. Roughness coefficients are provided in Table 13. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Bandera Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Barnes Branch and Zone A Tributaries	At the confluence with Bruins Creek	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Barnett Creek	At the confluence with Seco Creek	Approximately 0.37 miles upstream of the confluence with Seco Creek	N/A	N/A	January 1988	A	
Bauerlein Creek and Zone A Tributary	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Bear Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Bear Spring Creek and Zone A Tributary	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Beekman Creek and Zone A Tributary	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Benton Creek and Zone A Tributary	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Big Armidge Creek	At the confluence with Ranger Creek	Approximately 1.08 miles upstream of North Prong Road	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Blackjack Hollow and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Bravo Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Brewington Creek	At the confluence with Medina River	At the Bandera/Kerr County boundary	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Bruins Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Brushy Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Buck Hollow and Zone A Tributary	N/A	N/A	N/A	N/A	January 1988	A	
Buckelew Creek	At the confluence with Medina River	Approximately 2.69 miles upstream of the confluence with Medina River	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Can Creek	At the confluence with Sabinal River	Approximately 0.06 miles upstream of the confluence with Sabinal River	N/A	N/A	January 1988	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Carpenter Creek	At the confluence with West Prong Medina River	Approximately 3.14 miles upstream of the confluence with West Prong Medina River	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Cazey Creek	At the confluence with West Prong Medina River	Approximately 3.90 miles upstream of the confluence with West Prong Medina River	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Chalk Creek	At the confluence with Wallace Creek	Approximately 2.84 miles upstream of ST HWY 16 N	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Clark Creek	At the confluence with West Prong Medina River	Approximately 3.27 miles upstream of FM 337 E	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Cloud Hollow River	At the confluence with Privilege Creek	At the Bandera/Kerr County boundary	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Coal Creek 1	At the confluence with Ranger Creek	Approximately 2.26 miles upstream of the confluence with Ranger Creek	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Coal Creek 2	At the confluence with Medina River	Approximately 1.32 miles upstream of the confluence with Medina River	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Coalkin Creek	At the confluence with West Prong Medina River	Approximately 3.39 miles upstream of West Prong Medina River	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Commissioners Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Cow Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Cypress Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Dockery Creek	At the confluence with West Prong Medina River	Approximately 0.48 miles upstream of the confluence with West Prong Medina River	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Doe Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Dry Hollow Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Duncan Creek	At the confluence with West Prong Medina River	Approximately 1.26 miles upstream of FM 337 E	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
East Verde Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Elam Creek	At the confluence with West Prong Medina River	Approximately 4.3 miles upstream of FM 337 E	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Elm Creek 1	At the confluence with West Prong Medina River	Approximately 3.48 miles upstream of the confluence with West Prong Medina River	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Elm Creek 3 and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Hay Hollow	At the confluence with Seco Creek	Approximately 0.55 miles upstream of the confluence with Seco Creek	N/A	N/A	January 1988	A	
Hicks Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Hondo Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Honey Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Horse Creek	At the confluence with Medina River	Approximately 3.9 miles upstream of Horse Creek Road	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Hough Creek	At the confluence with Medina River	Approximately 0.35 miles upstream of ST HWY 16 N	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Indian Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Jackson Creek	At the confluence with West Prong Medina River	Approximately 3.14 miles upstream of the confluence with West Prong Medina River	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Jernigan Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Johnson Creek	At the confluence with Wallace Creek	Approximately 0.25 miles upstream of the confluence with Wallace Creek	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Laxson Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Left Hand Horse Creek	At the confluence with Horse Creek	Approximately 0.65 miles upstream of the confluence with Horse Creek	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Little Brewington Creek	At the confluence with Brewington Creek	At the Bandera/Kerr County boundary	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Little Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Little Mason Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Little Rocky Creek	At the confluence with Rocky Creek 1	At the Bandera/Kerr County boundary	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Love Creek	At the confluence with West Prong Medina River	Approximately 3.1 miles upstream of FM 337 E	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Madrona Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Marler Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Mason Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Medina Lake	At the Bandera/Medina County boundary	Approximately 11.5 miles upstream of the Bandera/Medina County boundary	N/A	N/A	June 2012	AE	
Medina River (Bandera)	Approximately 3.5 miles downstream of ST HWY 173 S	Approximately 2.8 miles downstream of FM 470	HEC-FFA	HEC-RAS 4.1	April 2017	AE	
Medina River	Approximately 2.8 miles downstream of FM 470	Approximately 0.93 miles upstream of Station C Road	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Medina River	Approximately 11.5 miles upstream of the Bandera/Medina County boundary	Approximately 3.3 miles upstream of English Crossing Road	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Medina River	Approximately 3.3 miles upstream of English Crossing Road	Approximately 3.5 miles downstream of ST HWY 173 S	HEC-FFA	HEC-2	January 1988	AE	
Medina River Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Mescal Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Mickle Creek	At the confluence with Medina River	Approximately 2.78 miles upstream of the confluence with Medina River	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Middle Prong Jernigan Creek	At the confluence with Jernigan Creek	Approximately 0.15 miles upstream of the confluence with Jernigan Creek	N/A	N/A	January 1988	A	
Middle Verde Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Mill Creek and Zone A Tributary	N/A	N/A	N/A	N/A	January 1988	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Mud Creek	At Mulberry Street	Approximately 0.91 miles upstream of Scooters Lane	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Mud Creek	At the confluence with Medina River	At Mulberry Street	HEC-FFA	HEC-2	January 1988	AE	
Myrtle Creek	At the confluence with Bandera Creek	Approximately 0.99 miles upstream of FM 2828	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
North Prong Jernigan Creek	At the confluence with Jernigan Creek	Approximately 0.25 miles upstream of the confluence with Jernigan Creek	N/A	N/A	January 1988	A	
Pecan Creek	At the confluence with Medina River	Approximately 1.8 miles upstream of FM 2107	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Pigeon Roost Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Pipe Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Privilege Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Pugmore Creek and Zone A Tributary	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Ranger Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Red Bluff Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Rhyne Creek and Zone A Tributary	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Robinson Creek	At the confluence with Wallace Creek	Approximately 3.37 miles upstream of the confluence with Wallace Creek	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Rocky Creek 1	At the confluence with Medina River	At the Bandera/Kerr County boundary	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Rocky Creek 2 and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Sabinal River and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
San Geronimo Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
San Julian Creek	At the confluence with Medina River	Approximately 0.55 miles upstream of the confluence with Medina River	HEC-HMS 4.1	HEC-RAS 4.1	November 2017	AE	
San Julian Creek	Approximately 0.55 miles upstream of the confluence with Medina River	Approximately 1.3 miles upstream of FM 1077	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
San Julian Creek Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Schladoer Creek	At the confluence with Seco Creek	Approximately 0.38 miles upstream of the confluence with Seco Creek	N/A	N/A	January 1988	A	
Seco Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Shephard Creek	At the confluence with Medina River	Approximately 2.11 miles upstream of North Prong Road	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Snow Creek	At the confluence with Sabinal River	Approximately 0.37 miles upstream of the confluence with Sabinal River	N/A	N/A	January 1988	A	
South Fork, San Geronimo Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Spires Creek 1 and Zone A Tributary	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Spires Creek 2 and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Spring Branch and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Spring Creek	At the confluence with West Prong Medina River	Approximately 1.36 miles upstream of the confluence with West Prong Medina River	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Spring Creek	At the confluence with Hondo Creek	Approximately 0.37 miles upstream of the confluence with Hondo Creek	N/A	N/A	January 1988	A	
Stanford Creek	At the confluence with West Prong Medina River	Approximately 0.41 miles upstream of FM 337 E	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Swift Creek and Zone A Tributary	N/A	N/A	N/A	N/A	January 1988	A	
Thomas Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Unnamed Split Reach to Medina River	At the confluence with Medina River	Approximately 1.1 miles upstream of the confluence with Medina River	HEC-FFA	HEC-2	January 1988	AE	
Unnamed Tributary 1 to Medina River	At the confluence with Medina River	Approximately 0.35 miles upstream of the confluence with Medina River	HEC-FFA	HEC-2	January 1988	AE	
Unnamed Tributary 1 to San Julian Creek	At the confluence with San Julian Creek	Approximately 1.03 miles upstream of the confluence with San Julian Creek	HEC-FFA	HEC-2	January 1988	AE	
Unnamed Tributary 1 to Unnamed Split Reach to Medina River	At the confluence with Unnamed Split Reach to Medina River	Approximately 0.28 miles upstream of the confluence with Unnamed Split Reach to Medina River	HEC-FFA	HEC-2	January 1988	AE	
Unnamed Tributary 2 to Medina River	At the confluence with Medina River	Approximately 0.49 miles upstream of the confluence with Medina River	HEC-FFA	HEC-2	January 1988	AE	
Unnamed Tributary 2 to Unnamed Split Reach to Medina River	At the confluence with Medina River	Approximately 0.44 miles upstream of the confluence with Medina River	HEC-FFA	HEC-2	January 1988	AE	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Walker Creek and Zone A Tributary	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Wallace Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
Wedgeworth Creek	At the confluence with Sabinal River	Approximately 0.08 miles upstream of the confluence with Sabinal River	N/A	N/A	January 1988	A	
West Prong Medina River and Zone A Tributary	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	
West Sabinal River and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
West Seco Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
West Verde Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Williams Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Winans Creek and Zone A Tributaries	N/A	N/A	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Wolf Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Wright Creek and Zone A Tributaries	N/A	N/A	N/A	N/A	January 1988	A	
Wyatt Creek	At the confluence with Ranger Creek	Approximately 2.3 miles upstream of the confluence with Ranger Creek	SIR 2009-5087 Regression (w/ OmegaEM)	HEC-RAS 4.1	April 2017	A	

Table 13: Roughness Coefficients

Flooding Source	Channel “n”	Overbank “n”
Medina River	0.040 to 0.055	0.040 to 0.120

5.3 Coastal Analyses

This section is not applicable to this Flood Risk Project.

Table 14: Summary of Coastal Analyses
[Not Applicable to this Flood Risk Project]

5.3.1 Total Stillwater Elevations

This section is not applicable to this Flood Risk Project.

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas
[Not Applicable to this Flood Risk Project]

Table 15: Tide Gage Analysis Specifics
[Not Applicable to this Flood Risk Project]

5.3.2 Waves

This section is not applicable to this Flood Risk Project.

5.3.3 Coastal Erosion

This section is not applicable to this Flood Risk Project.

5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Project.

Table 16: Coastal Transect Parameters
[Not Applicable to this Flood Risk Project]

Figure 9: Transect Location Map
[Not Applicable to this Flood Risk Project]

5.4 Alluvial Fan Analyses

This section is not applicable to this Flood Risk Project.

Table 17: Summary of Alluvial Fan Analyses
[Not Applicable to this Flood Risk Project]

Table 18: Results of Alluvial Fan Analyses
[Not Applicable to this Flood Risk Project]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please visit the NGS website at www.ngs.noaa.gov.

The datum conversion locations and values that were calculated for Bandera County are provided in Table 19.

Table 19: Countywide Vertical Datum Conversion

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
A Bar A Ranch	SE	-99.250	29.750	0.45
Bandera	SE	-99.000	29.625	0.38
Bandera Pass	SE	-99.000	29.750	0.34

Table 19: Countywide Vertical Datum Conversion, continued

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
Center Point	SE	-99.000	29.875	0.34
Circle Bluff	SE	-99.625	29.750	0.40
Diamond S Ranch	SE	-99.375	29.875	0.35
Echo Hill Ranch	SE	-99.250	29.875	0.32
Fall Creek	SE	-99.125	29.875	0.34
Flatrock Crossing	SE	-99.375	29.500	0.40
Hillcrest Ranch	SE	-99.625	29.875	0.37
Jack Mountain	SE	-98.750	29.625	0.37
Love Creek	SE	-99.375	29.750	0.48
Magers Crossing	SE	-99.625	29.500	0.32
Medina Lake	SE	-98.875	29.500	0.38
Pipe Creek	SE	-98.875	29.625	0.39
Ranger Creek	SE	-98.750	29.750	0.34
Rio Frio	SE	-99.625	29.625	0.33
Rock Cliff	SE	-99.125	29.750	0.35
Sabianl Canyon	SE	-99.500	29.750	0.43
San Geronimo	SE	-98.750	29.500	0.38
Seco Pass	SE	-99.375	29.625	0.46
Tarpley	SE	-99.250	29.625	0.45
Tarpley Pass	SE	-99.125	29.625	0.49
Texas Mountain	SE	-99.250	29.500	0.45
Timber Creek	SE	-99.000	29.500	0.46
Turkey Knob	SE	-98.875	29.750	0.36
Twin Hollow	SE	-99.125	-99.125	0.46
Utopia	SE	-99.500	-99.500	0.33
Van Raub	SE	-98.625	29.625	0.38
Vanderpool	SE	-99.500	29.625	0.34
Well Hollow	SE	-99.500	29.875	0.38
Average Conversion from NGVD29 to NAVD88 = 0.388 feet				

Table 20: Stream-Based Vertical Datum Conversion
[Not Applicable to this Flood Risk Project]

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM Database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping.

Base map information shown on the FIRM was derived from the sources described in Table 21.

Table 21: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
Political Boundaries	TXDOT	2006	1:12,000	City and county boundaries
Surface Water Features	FEMA	2011	1:12,000	Streams, rivers, and lakes were derived from National Flood Hazard Layer
Transportation Features	Bandera County	2018	1:12,000	Bandera County road features

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 22.

In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary has been shown. Small areas

within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 23, "Floodway Data."

Certain flooding sources may have been studied that do not have published BFEs on the FIRMs, or for which there is a need to report the 1% annual chance flood elevations at selected cross sections because a published Flood Profile does not exist in this FIS Report. These streams may have also been studied using methods to determine non-encroachment zones rather than floodways. For these flooding sources, the 1% annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 22. All topographic data used for modeling or mapping has been converted as necessary to NAVD88.

Table 22: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
Bandera County, Unincorporated Areas	All within HUC 12110106 and HUC 12110107	Contour Lines	N/A	N/A	USGS 1964-1970
Bandera County, Unincorporated Areas	Beekman Creek, Elm Creek 3, Madrona Creek, Medina River, Mescal Creek, Rocky Creek 2, San Geronimo Creek, South Fork San Geronimo Creek, and Zone A Tributaries	Light Detection and Ranging data (LiDAR)	N/A	N/A	TNRIS 2010

Table 22: Summary of Topographic Elevation Data used in Mapping, continued

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
Bandera County, Unincorporated Areas	Bandera Creek, Bauerlein Creek, Brewington Creek, Carpenter Creek, Cazey Creek, Clark Creek, Coalkin Creek, Doe Creek, Duncan Creek, Elam Creek, Horse Creek, Jackson Creek, Left Hand Horse Creek, Little Brewington Creek, Little Mason Creek, Little Rocky Creek, Love Creek, Mason Creek, Medina River, Mickle Creek, Myrtle Creek, Pecan Creek, Rhyne Creek, Rocky Creek 1, Spring Creek, Stanford Creek, West Prong Medina River, and Zone A Tributaries	Light Detection and Ranging data (LiDAR)	N/A	N/A	TNRIS 2012
Bandera County, Unincorporated Areas	Benton Creek, Chalk Creek, and Robinson Creek	Light Detection and Ranging data (LiDAR)	N/A	N/A	TNRIS 2011
Bandera, City of; Bandera County, Unincorporated Areas	Flooding sources not listed elsewhere in this table	Light Detection and Ranging data (LiDAR)	N/A	N/A	TNRIS 2014

BFEs shown at cross sections on the FIRM represent the 1% annual chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report.

Table 23: Floodway Data

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Medina River (Bandera)								
A	3	679	13,997	11.3	1,196.0	1,196.0	1,196.0	0.0
B	2,364	1,200	18,821	8.4	1,200.5	1,200.5	1,201.2	0.7
C	4,415	1,060	17,730	8.9	1,204.0	1,204.0	1,204.9	0.9
D	8,753	2,000	27,325	5.8	1,211.5	1,211.5	1,211.9	0.4
E	12,292	890	15,428	10.3	1,216.8	1,216.8	1,217.2	0.4
F	14,548	620	16,990	9.3	1,223.7	1,223.7	1,224.4	0.7
G	15,921	1,510	26,438	6.0	1,226.4	1,226.4	1,227.3	0.9
H	18,269	850	19,185	8.3	1,229.3	1,229.3	1,230.3	0.9
I	19,736	780	18,301	8.7	1,233.6	1,233.6	1,234.3	0.6
J	20,966	650	16,363	9.7	1,236.6	1,236.6	1,237.2	0.6
K	26,714	1,060	18,656	8.5	1,244.5	1,244.5	1,245.0	0.5
L	29,997	1,880	21,476	7.4	1,250.8	1,250.8	1,251.4	0.6
M	33,688	1,477	22,238	7.1	1,257.2	1,257.2	1,257.9	0.7
N	36,716	1,770	26,326	6.0	1,264.4	1,264.4	1,265.2	0.8

¹ In feet above Limit of Detailed Study (Approximately 1,085 feet above confluence with San Julian Creek)

TABLE 23	FEDERAL EMERGENCY MANAGEMENT AGENCY BANDERA COUNTY, TEXAS AND INCORPORATED AREAS	FLOODWAY DATA
		FLOODING SOURCE: MEDINA RIVER (BANDERA)

Table 24: Flood Hazard and Non-Encroachment Data for Selected Streams
[Not Applicable to this Flood Risk Project]

6.4 Coastal Flood Hazard Mapping

This section is not applicable to this Flood Risk Project.

Table 25: Summary of Coastal Transect Mapping Considerations
[Not Applicable to this Flood Risk Project]

6.5 FIRM Revisions

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 30, “Map Repositories”).

6.5.1 Letters of Map Amendment

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA.

To obtain an application for a LOMA, visit www.fema.gov/floodplain-management/letter-map-amendment-loma and download the form “MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill”. Visit the “Flood Map-Related Fees” section to determine the cost, if any, of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at www.fema.gov/online-tutorials.

For more information about how to apply for a LOMA, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627).

6.5.2 Letters of Map Revision Based on Fill

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA's determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained in the same manner as that for a LOMA, by visiting www.fema.gov/floodplain-management/letter-map-amendment-loma for the "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill" or by calling the FEMA Map Information eXchange, toll free, at 1-877-FEMA MAP (1-877-336-2627). Fees for applying for a LOMR-F, if any, are listed in the "Flood Map-Related Fees" section.

A tutorial for LOMR-F is available at www.fema.gov/online-tutorials.

6.5.3 Letters of Map Revision

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/mt-2-application-forms-and-instructions and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the Bandera County FIRM are listed in Table 26. Please note that this table only includes LOMCs that have been issued on the FIRM panels updated by this map revision. For all other areas within this county, users should be aware that revisions to the FIS Report made by prior LOMRs may not be reflected herein and users will need to continue to use the previously issued LOMRs to obtain the most current data.

Table 26: Incorporated Letters of Map Change

Case Number	Effective Date	Flooding Source	FIRM Panel(s)
17-06-0498P	11/09/2017	San Julian Creek	48019C0385F

6.5.4 Physical Map Revisions

A Physical Map Revisions (PMR) is an official republication of a community's NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory

floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit www.fema.gov and visit the "Flood Map Revision Processes" section.

6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

6.5.6 Community Map History

The current FIRM presents flooding information for the entire geographic area of Bandera County. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBM) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the incorporated communities and the unincorporated areas in the county that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 27, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.
- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 27 but not identified on the map, the community is treated as if it were unmapped.

- *Initial FHBM Effective Date* is the effective date of the first FHBM. This date may be the same date as the Initial NFIP Map Date.
- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.
- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community.
- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As countywide studies are completed or revised, each community listed should have its FIRM dates updated accordingly to reflect the date of the countywide study. Once the FIRMs exist in countywide format, as PMRs of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the Bandera County FIRMs in countywide format was 02/04/2011.

Table 27: Community Map History

Community Name	Initial Identification Date	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Bandera, City of	04/12/1974	04/12/1974	12/19/1975	12/01/1977	05/15/2020 02/04/2011 07/17/1989 10/13/1981
Bandera County, Unincorporated Areas	06/18/1976	06/18/1976	N/A	11/01/1978	05/15/2020 02/04/2011 02/15/1991

SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

7.1 Contracted Studies

Table 28 provides a summary of the contracted studies, by flooding source, that are included in this FIS Report.

Table 28: Summary of Contracted Studies Included in this FIS Report

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Bandera Creek and Zone A Tributaries	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report, continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Barnes Branch and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Barnett Creek	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Bauerlein Creek and Zone A Tributary	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Bear Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Bear Spring Creek and Zone A Tributary	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Beekman Creek and Zone A Tributary	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Benton Creek and Zone A Tributary	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Big Armidge Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Blackjack Hollow and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Bravo Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Brewington Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Bruins Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report, continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Brushy Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Buck Hollow and Zone A Tributary	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Buckelew Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Can Creek	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Carpenter Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Cazey Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Chalk Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Clark Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Cloud Hollow River	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Coal Creek 1	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Coal Creek 2	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Coalkin Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Commissioners Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report, continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Cow Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Cypress Creek and Zone A Tributaries	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Dockery Creek	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Doe Creek and Zone A Tributaries	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Dry Hollow Creek and Zone A Tributaries	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Duncan Creek	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
East Verde Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Elam Creek	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Elm Creek 1	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Elm Creek 3 and Zone A Tributaries	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Hay Hollow	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Hicks Creek and Zone A Tributaries	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Hondo Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report, continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Honey Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Horse Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Hough Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Indian Creek and Zone A Tributary	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Jackson Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Jernigan Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Johnson Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Laxson Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Left Hand Horse Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Little Brewington Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Little Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Little Mason Creek and Zone A Tributary	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Little Rocky Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report, continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Love Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Madrona Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Marler Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Mason Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Medina Lake	May 15, 2020	N/A	12-06-0946P	June 2012	Bandera County, Unincorporated Areas
Medina River (Bandera)	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera, City of; Bandera County, Unincorporated Areas
Medina River	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Medina River	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Medina River	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Medina River Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera, City of; Bandera County, Unincorporated Areas
Mescal Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Mickle Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Middle Prong Jernigan Creek	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report, continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Middle Verde Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Mill Creek and Zone A Tributary	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Mud Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Mud Creek	February 4, 2011	USACE	N/A	January 1988	Bandera, City of; Bandera County, Unincorporated Areas
Myrtle Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
North Prong Jernigan Creek	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Pecan Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Pigeon Roost Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Pipe Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Privilege Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Pugmore Creek and Zone A Tributary	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Ranger Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report, continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Red Bluff Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Rhyne Creek and Zone A Tributary	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Robinson Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Rocky Creek 1	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Rocky Creek 2 and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Sabinal River and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
San Geronimo Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
San Julian Creek (Zone AE)	May 15, 2020	N/A	17-06-0498P	November 2017	Bandera County, Unincorporated Areas
San Julian Creek and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Schladoer Creek	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Seco Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Shephard Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Snow Creek	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report, continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
South Fork, San Geronimo Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Spires Creek 1 and Zone A Tributary	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Spires Creek 2 and Zone A Tributaries	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Spring Branch and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Spring Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Spring Creek	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Stanford Creek	May 15, 2020	AECOM/Halff Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Swift Creek and Zone A Tributary	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Thomas Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Unnamed Split Reach to Medina River	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Unnamed Tributary 1 to Medina River	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Unnamed Tributary 1 to San Julian Creek	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report, continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Unnamed Tributary 1 to Unnamed Split Reach to Medina River	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Unnamed Tributary 2 to Medina River	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Unnamed Tributary 2 to Unnamed Split Reach to Medina River	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Walker Creek and Zone A Tributary	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Wallace Creek and Zone A Tributaries	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
Wedgeworth Creek	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
West Prong Medina River and Zone A Tributary	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas
West Sabinal River and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
West Seco Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
West Verde Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Williams Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Winans Creek and Zone A Tributaries	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report, continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Wolf Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Wright Creek and Zone A Tributaries	February 4, 2011	USACE	N/A	January 1988	Bandera County, Unincorporated Areas
Wyatt Creek	May 15, 2020	AECOM/Half Associates	14-06-1699S	April 2017	Bandera County, Unincorporated Areas

7.2 Community Meetings

The dates of the community meetings held for this Flood Risk Project and previous Flood Risk Projects are shown in Table 29. These meetings may have previously been referred to by a variety of names (Community Coordination Officer (CCO), Scoping, Discovery, etc.), but all meetings represent opportunities for FEMA, community officials, study contractors, and other invited guests to discuss the planning for and results of the project.

Table 29: Community Meetings

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Bandera, City of	05/15/2020	11/20/2014	Discovery	Bandera County, NRCS, Texas Agrilife Extension, SARA, AECOM and Halff
		07/11/2017	Flood Risk Review	Bandera County, SARA and AECOM
		08/22/2018	Final CCO Meeting	FEMA, City of Bandera, Bandera County, SARA, TWDB and Compass PTS
Bandera County, Unincorporated Areas	05/15/2020	11/20/2014	Discovery	Bandera County, NRCS, Texas Agrilife Extension, SARA, AECOM and Halff
		07/11/2017	Flood Risk Review	Bandera County, SARA and AECOM
		08/22/2018	Final CCO Meeting	FEMA, City of Bandera, Bandera County, SARA, TWDB and Compass PTS

SECTION 8.0 – ADDITIONAL INFORMATION

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see www.fema.gov.

Table 30 is a list of the locations where FIRMs for Bandera County can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 30: Map Repositories

Community	Address	City	State	Zip Code
Bandera, City of	City Hall 511 Main Street	Bandera	TX	78003
Bandera County, Unincorporated Areas	Bandera County Engineer's Office 502 11th Street	Bandera	TX	78003

The National Flood Hazard Layer (NFHL) dataset is a compilation of effective FIRM Databases and LOMCs. Together they create a GIS data layer for a State or Territory. The NFHL is updated as studies become effective and extracts are made available to the public monthly. NFHL data can be viewed or ordered from the website shown in Table 31.

Table 31 contains useful contact information regarding the FIS Report, the FIRM, and other relevant flood hazard and GIS data. In addition, information about the State NFIP Coordinator and GIS Coordinator is shown in this table. At the request of FEMA, each Governor has designated an agency of State or territorial government to coordinate that State's or territory's NFIP activities. These agencies often assist communities in developing and adopting necessary floodplain management measures. State GIS Coordinators are knowledgeable about the availability and location of State and local GIS data in their state.

Table 31: Additional Information

FEMA and the NFIP	
FEMA and FEMA Engineering Library website	www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library
NFIP website	www.fema.gov/national-flood-insurance-program
NFHL Dataset	msc.fema.gov

Table 31: Additional Information, continued

FEMA Region VI	Jennifer Knecht FEMA Region Representative FEMA Region VI 800 North Loop 288 Denton, TX 76209 (940) 898-5553 Jennifer.Knecht@fema.dhs.gov
Other Federal Agencies	
USGS website	www.usgs.gov
Hydraulic Engineering Center website	www.hec.usace.army.mil
State Agencies and Organizations	
State NFIP Coordinator	Michael Segner State NFIP Coordinator Texas Water Development Board 1700 North Congress Avenue P.O. Box 13231 Austin, TX 78711-3231 (512) 463-3509 Fax: (512) 475-2053 michael.segner@twddb.state.tx.us
State GIS Coordinator	Mike Ouimet State GIS Coordinator 300 West 15th Street P.O. Box 13564 Austin, TX 78711-3564 (512) 305-9076 Fax: (512) 475-4759 mike.ouimet@dir.state.tx.us

SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

Table 32 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

Table 32: Bibliography and References

Citation in this FIS	Publisher/ Issuer	Publication Title, "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
Center for Research in Water Resources, 1996	University of Texas	<i>Generalized Skew Coefficients of Annual Maximum Streamflow Logarithms in Southwestern Division, U.S. Army Corps of Engineers</i>		Austin	1996	
FEMA, 2011	Federal Emergency Management Agency	<i>Flood Insurance Study, City of Bandera</i>		Washington, D.C.	February 1991	FEMA Flood Map Service Center msc.fema.gov
FEMA, 2011	Federal Emergency Management Agency	<i>Flood Insurance Study, Bandera County, Texas, and Unincorporated Areas</i>		Washington, D.C.	February 2011	FEMA Flood Map Service Center msc.fema.gov
FEMA, 2011	Federal Emergency Management Agency	<i>Flood Insurance Study, Bandera County</i>		Washington, D.C.	July 1991	FEMA Flood Map Service Center msc.fema.gov
TNRIS, 2010	Texas Natural Resources Information System	<i>LiDAR Data</i>		Austin, TX	2010	https://tnris.org/data-catalog/
TNRIS, 2011	Texas Natural Resources Information System	<i>LiDAR Data</i>		Austin, TX	2011	https://tnris.org/data-catalog/
TNRIS, 2012	Texas Natural Resources Information System	<i>LiDAR Data</i>		Austin, TX	2012	https://tnris.org/data-catalog/
TNRIS, 2014	Texas Natural Resources Information System	<i>LiDAR Data</i>		Austin, TX	2014	https://tnris.org/data-catalog/

Table 32: Bibliography and References, continued

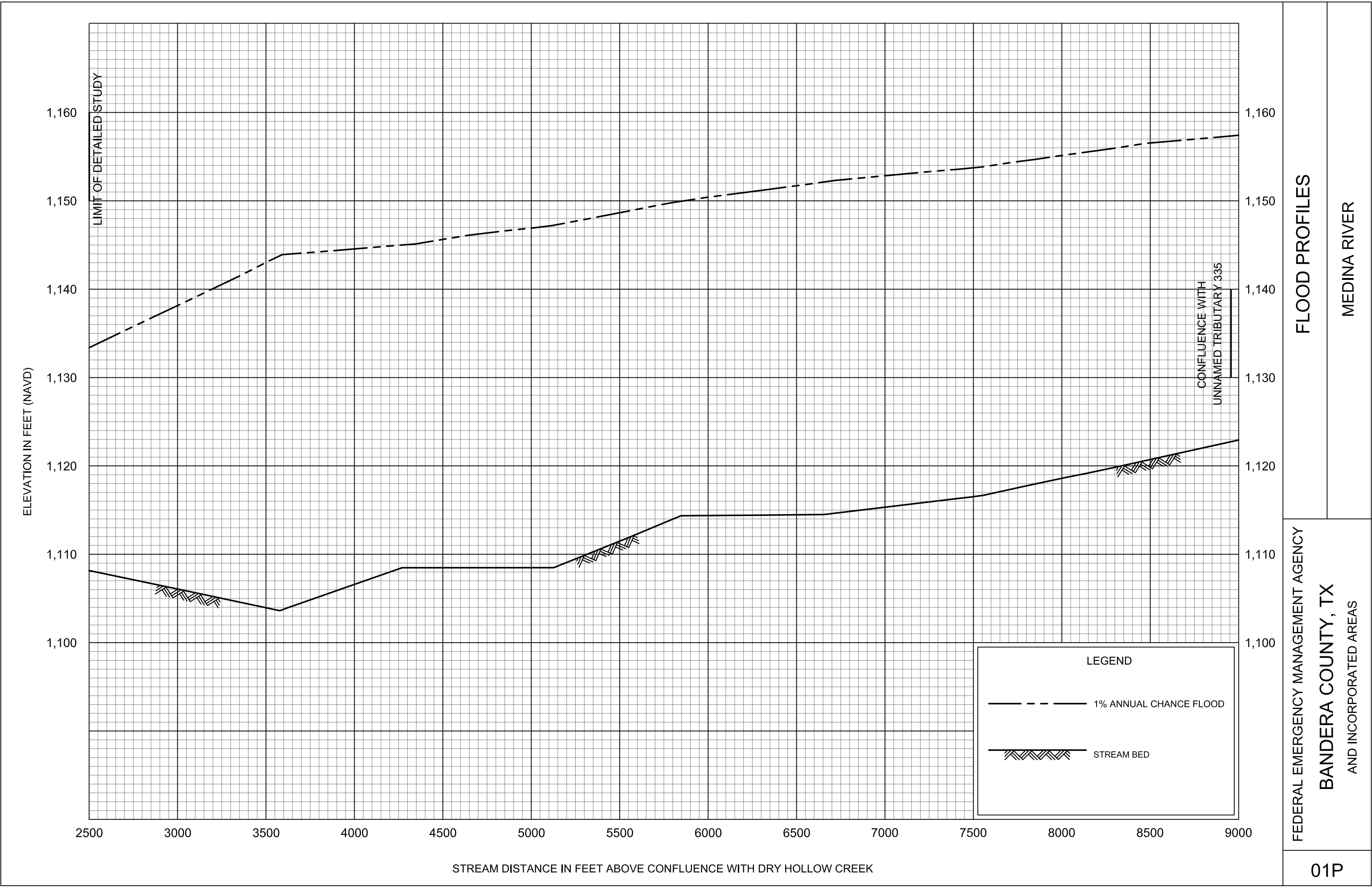
Citation in this FIS	Publisher/Issuer	Publication Title, "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/Date of Issuance	Link
USACE	United States Army Corps of Engineers	<i>HEC-FFA Flood Frequency Analysis Computer Program</i>		Davis, CA		
USACE, 1984	U.S. Army Corps of Engineers, Hydrologic Engineering Center	<i>HEC-2 Water Surface Profiles, Generalized Computer Program</i>		Davis, CA	1984	
USACE, 2010	U.S. Army Corps of Engineers, Hydrologic Engineering Center	<i>HEC-RAS River Analysis System v4.1</i>		Davis, CA	January 2010	https://www.hec.usace.army.mil/software/hecras/

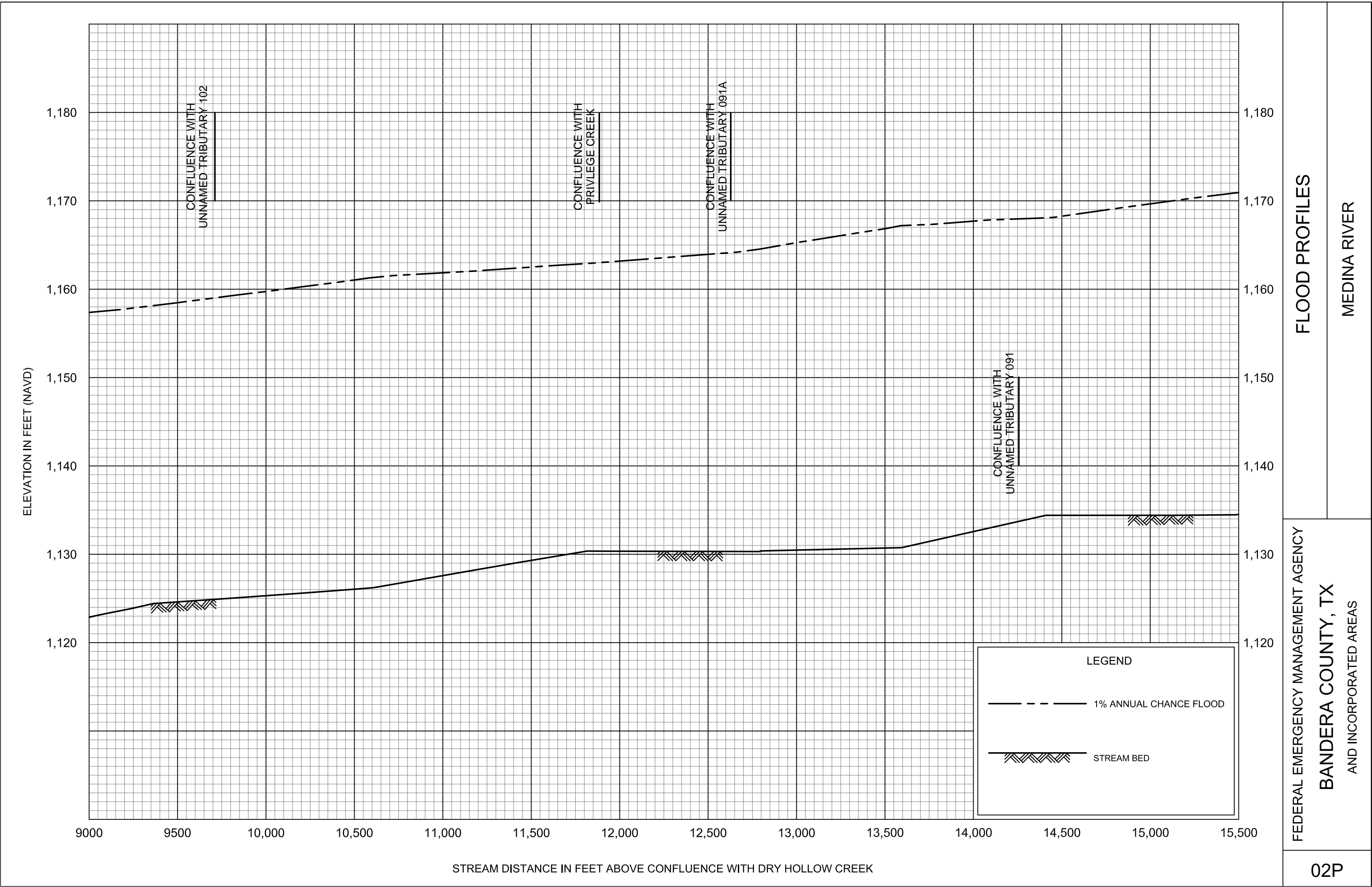
Table 32: Bibliography and References, continued

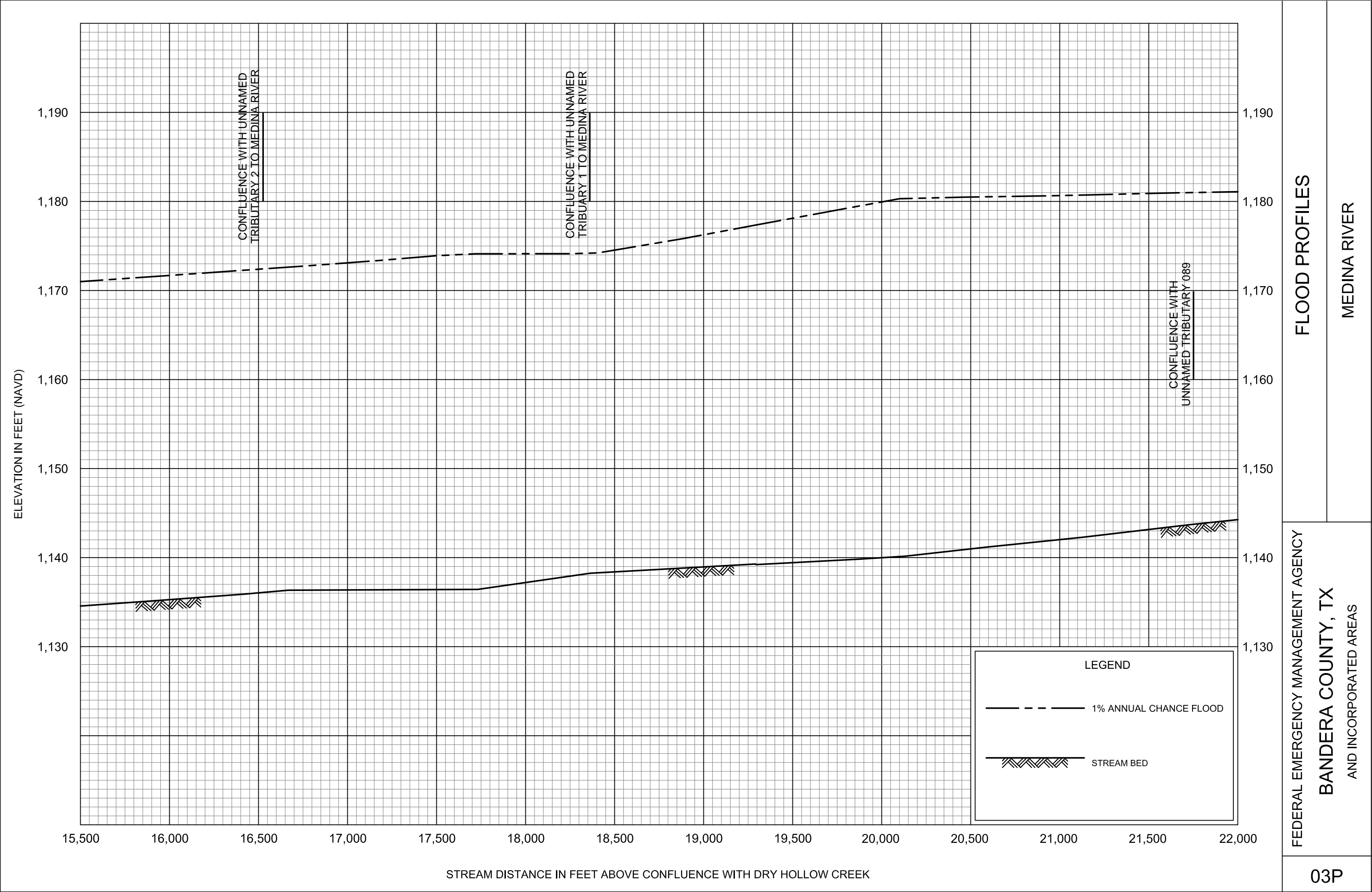
Citation in this FIS	Publisher/Issuer	Publication Title, "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/Date of Issuance	Link
USGS	U.S. Department of Interior, Geological Survey	<i>7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 Feet. Abar A Ranch, Texas 1964; Bandera, Texas, 1964; Bandera Pass, Texas, 1964; Diamond S. Ranch, Texas 1964; Echo Hill Ranch, Texas, 1964; Fall Creek, Texas, 1964; Jack Mountain, Texas 1970; Love Creek, Texas, 1970; Medina Lake, Texas, 1964; Pipe Creek, Texas, 1964; Rock Cliff Reservoir, Texas, 1964; Sabinal Canyon, Texas, 1964; Seco Pass, Texas, 1964; Tarpley, Texas, 1964; Tarpley Pass, Texas, 1964; Timber Creek, Texas, 1964; Turkey Knob, Texas, 1964; Twin Hollow, Texas, 1969; Vanderpool, Texas, 1969; Well Hollow, Texas, 1964.</i>		Washington, D.C.	Various	topomaps.usgs.gov
USGS, 1981	U.S. Department of Interior, Geological Survey, Office of Water Data Collection, Interagency Advisory Committee on Water Data	<i>Guidelines for Determining Flood Flow Frequency, Bulletin 17B</i>		Reston, VA	1981	

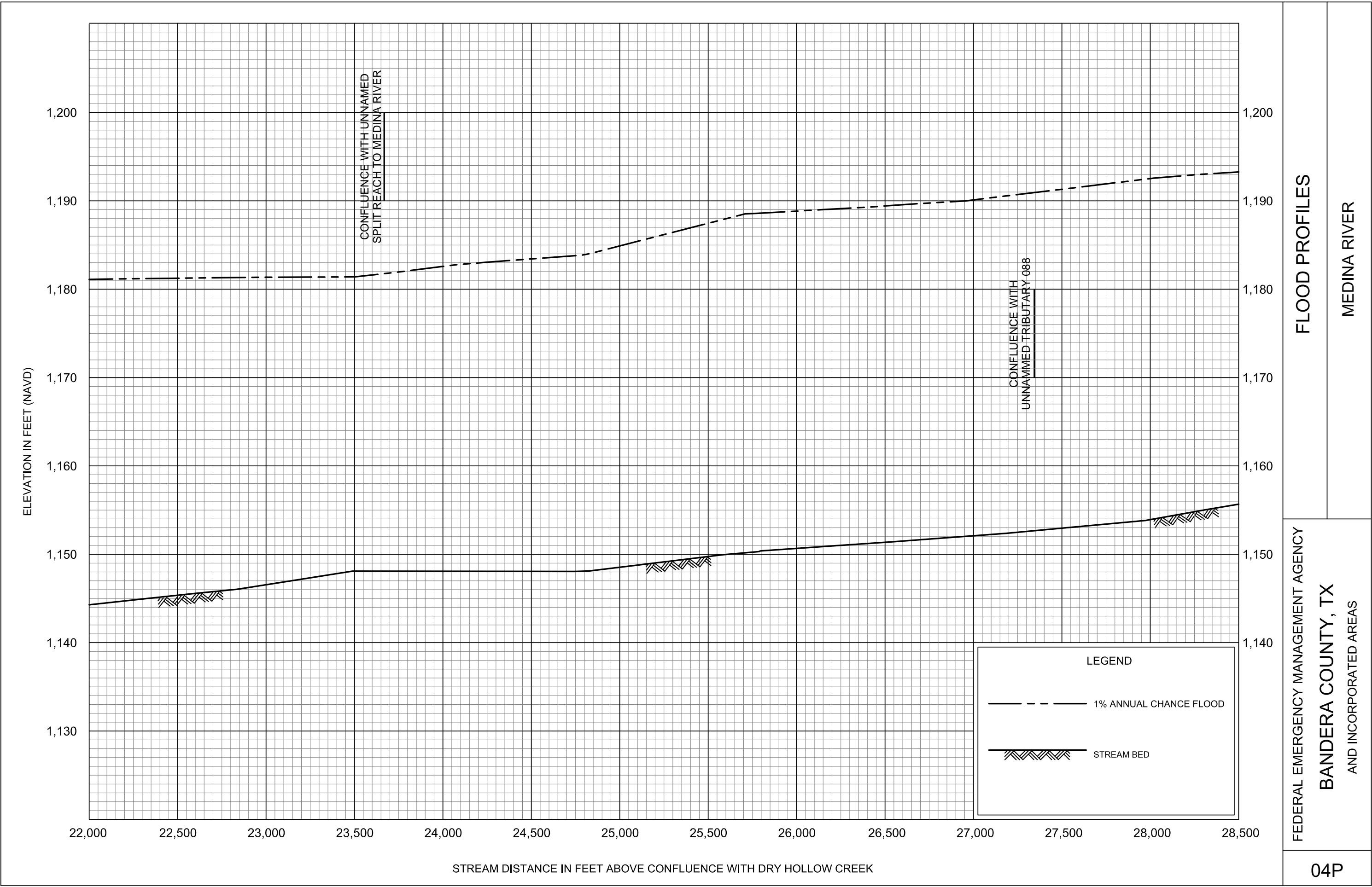
Table 32: Bibliography and References, continued

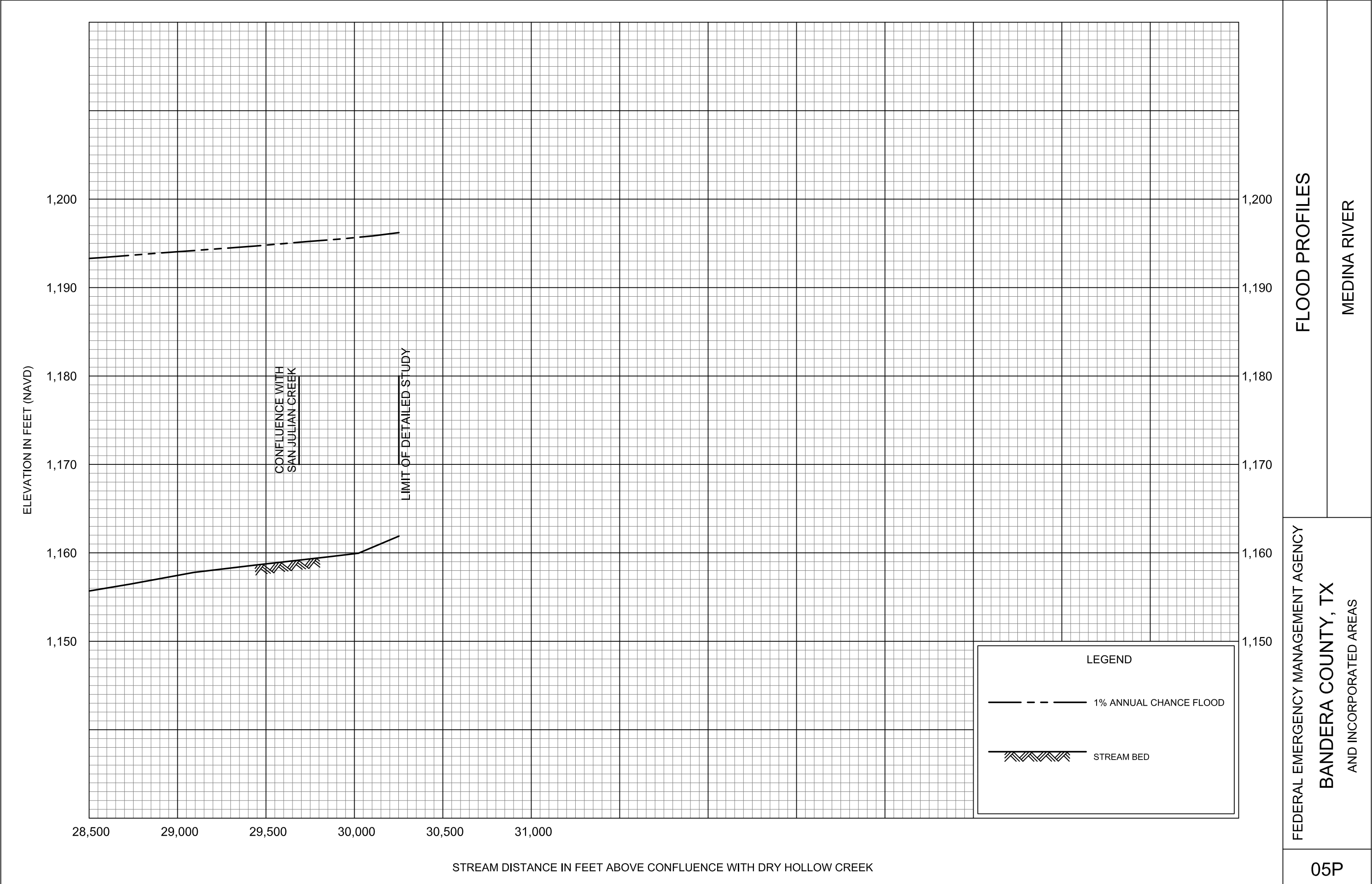
Citation in this FIS	Publisher/Issuer	Publication Title, "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/Date of Issuance	Link
USGS, 2009	U.S. Department of Interior, Geological Survey, in cooperation with the Texas Department of Transportation and the Federal Highway Administration	<i>Regression Equations for Estimation of Annual Peak-Streamflow Frequency for Undeveloped Watersheds in Texas Using an L-moment-Based, PRESS-Minimized, Residual-Adjusted Approach</i>	William H. Asquith, Meghan C. Roussel	Austin, TX	June 2009	https://pubs.usgs.gov/sir/2009/5087/pdf/sir2009-5087.pdf
Ven Te Chow	McGraw Hill	<i>Open Channel Hydraulics</i>		New York	1959	

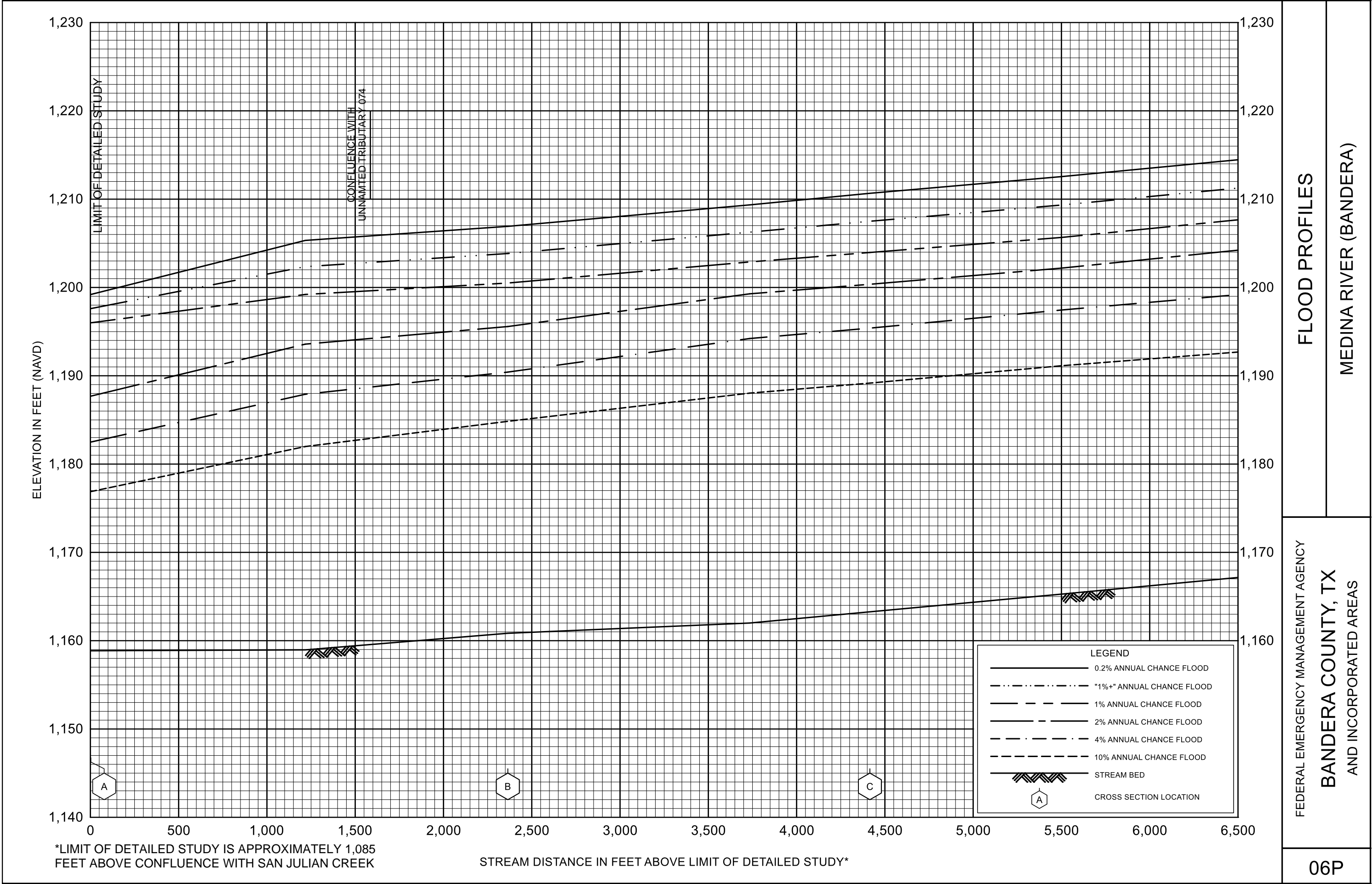






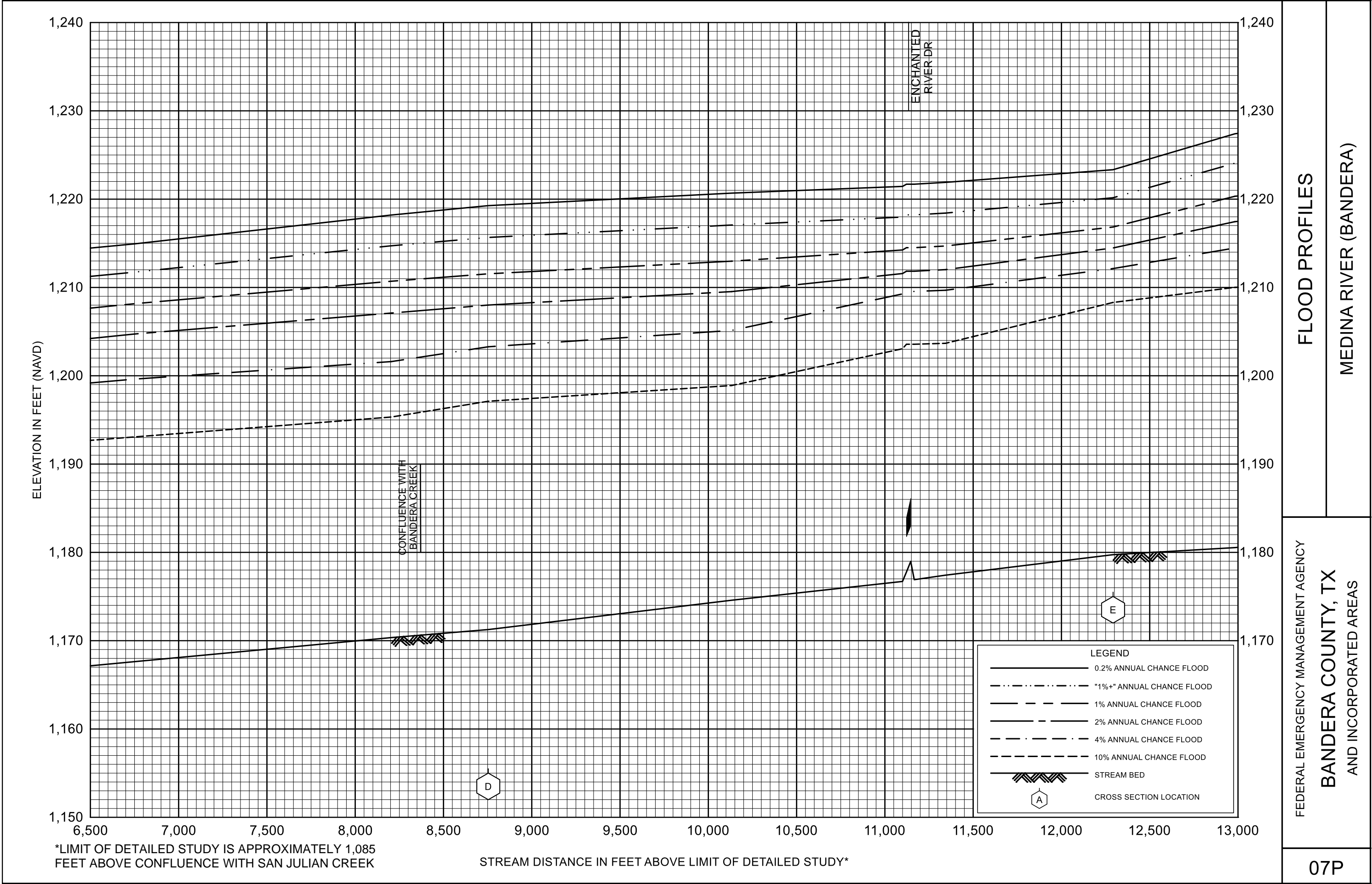


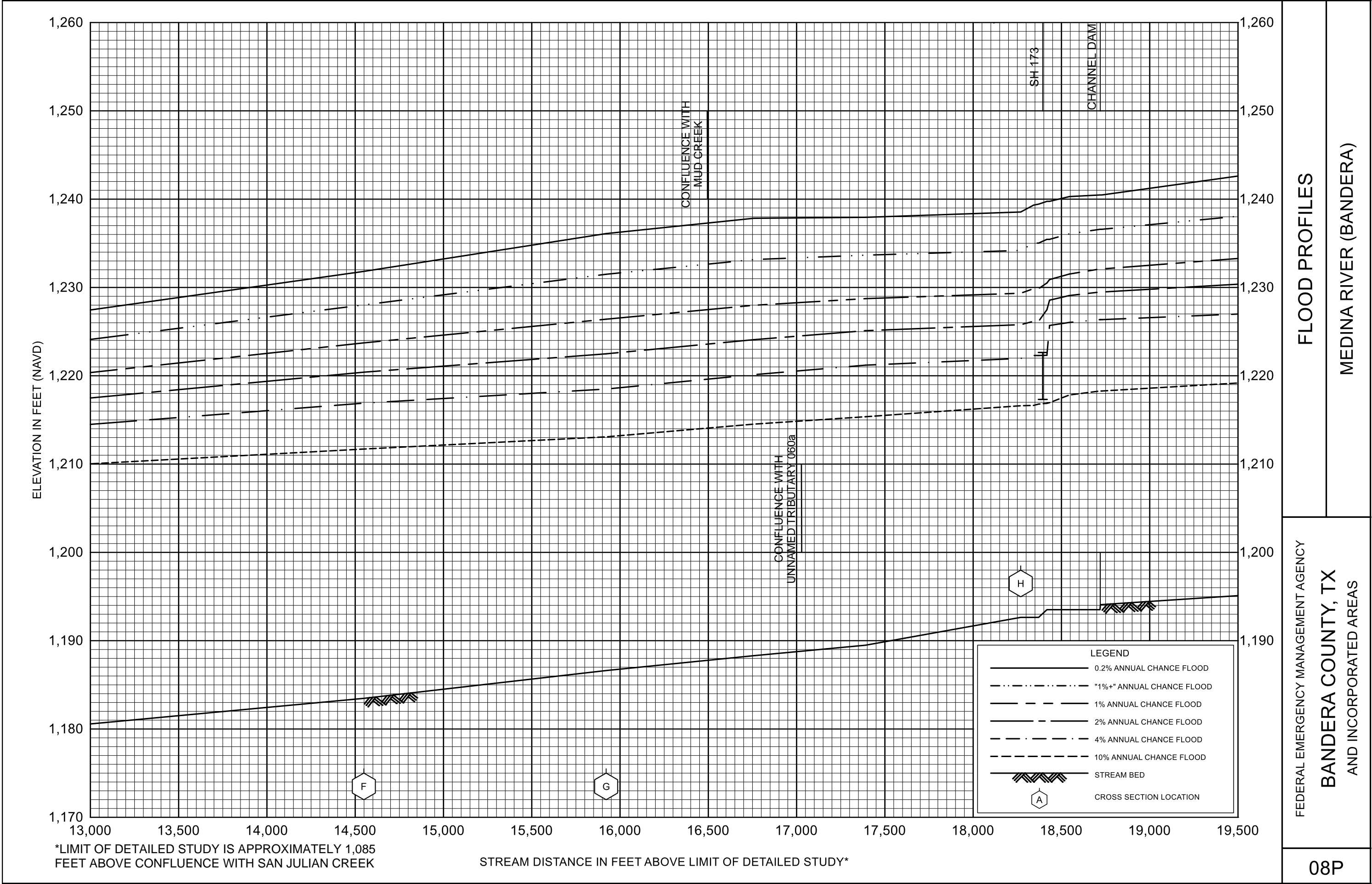




*LIMIT OF DETAILED STUDY IS APPROXIMATELY 1,085 FEET ABOVE CONFLUENCE WITH SAN JULIAN CREEK

STREAM DISTANCE IN FEET ABOVE LIMIT OF DETAILED STUDY*





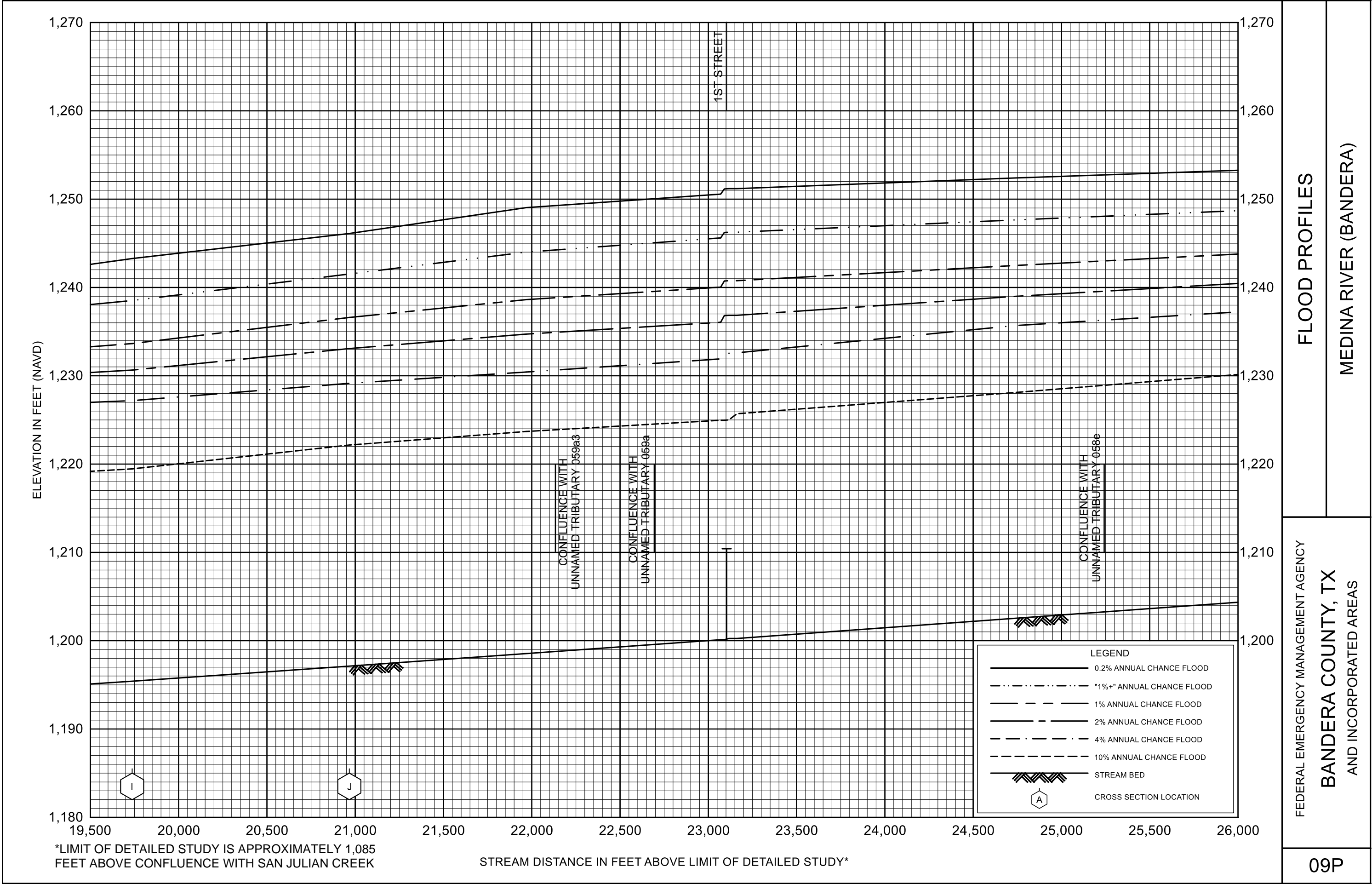
FLOOD PROFILES

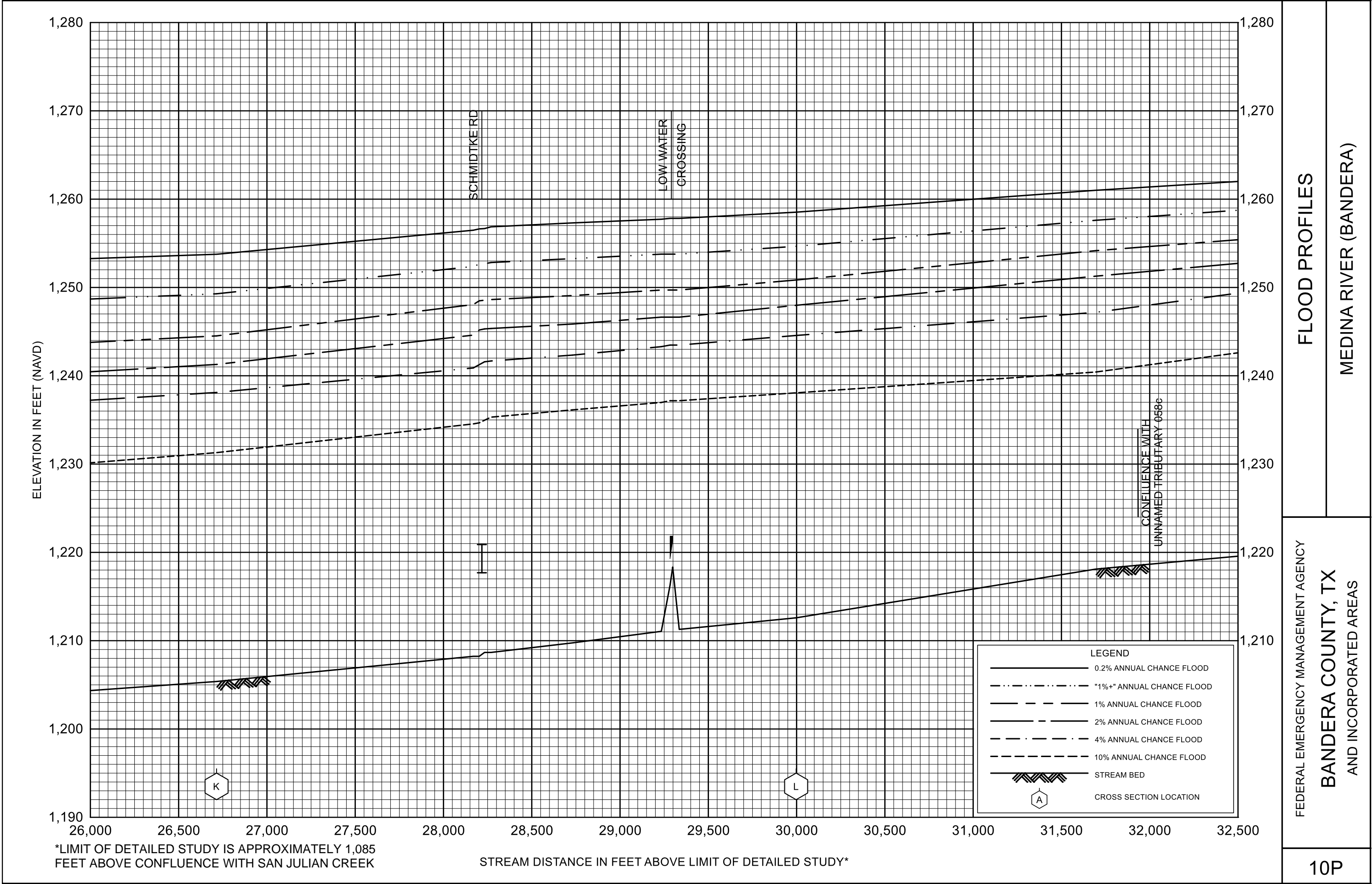
MEDINA RIVER (BANDERA)

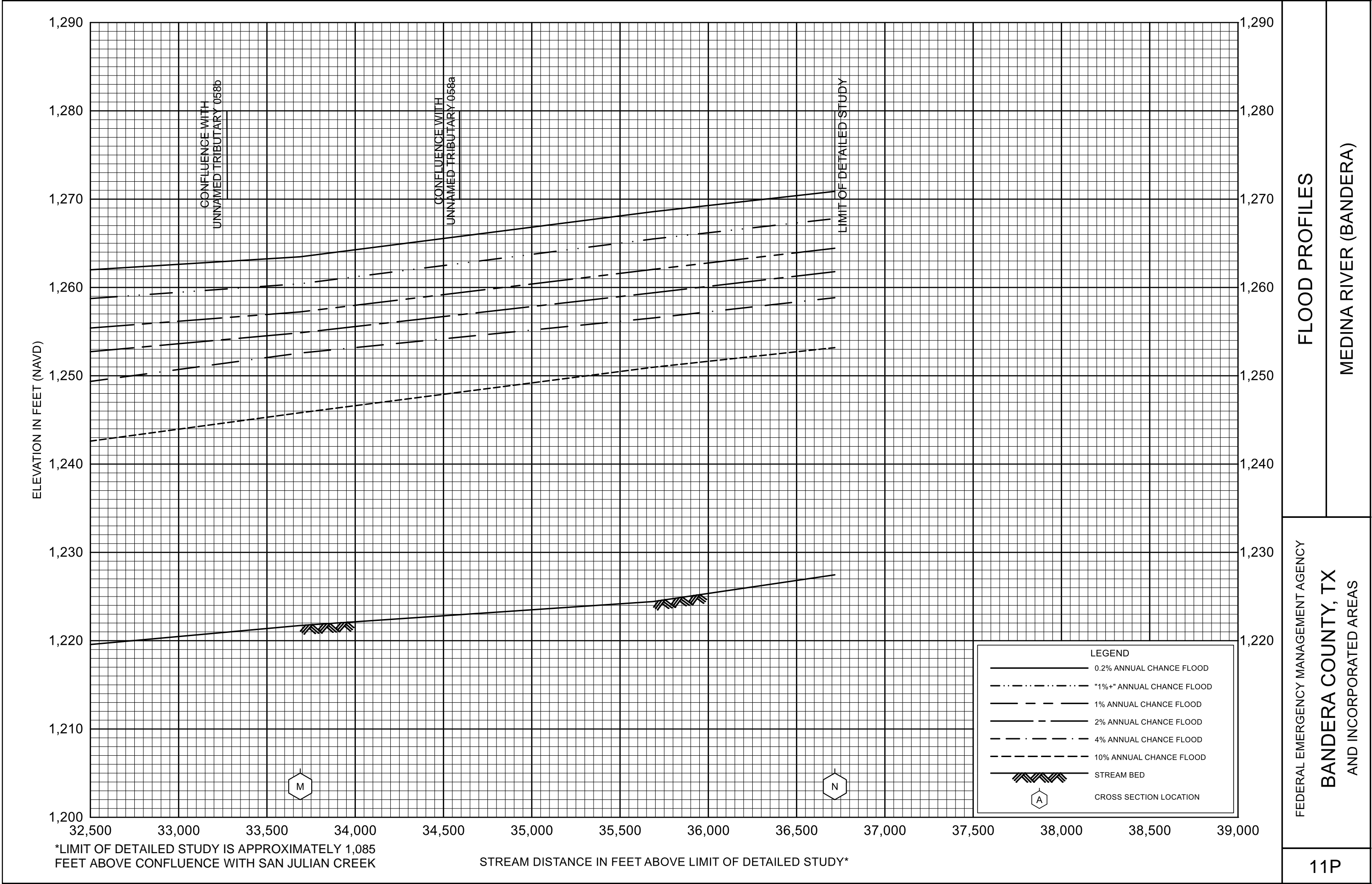
FEDERAL EMERGENCY MANAGEMENT AGENCY

BANDERA COUNTY, TX

AND INCORPORATED AREAS

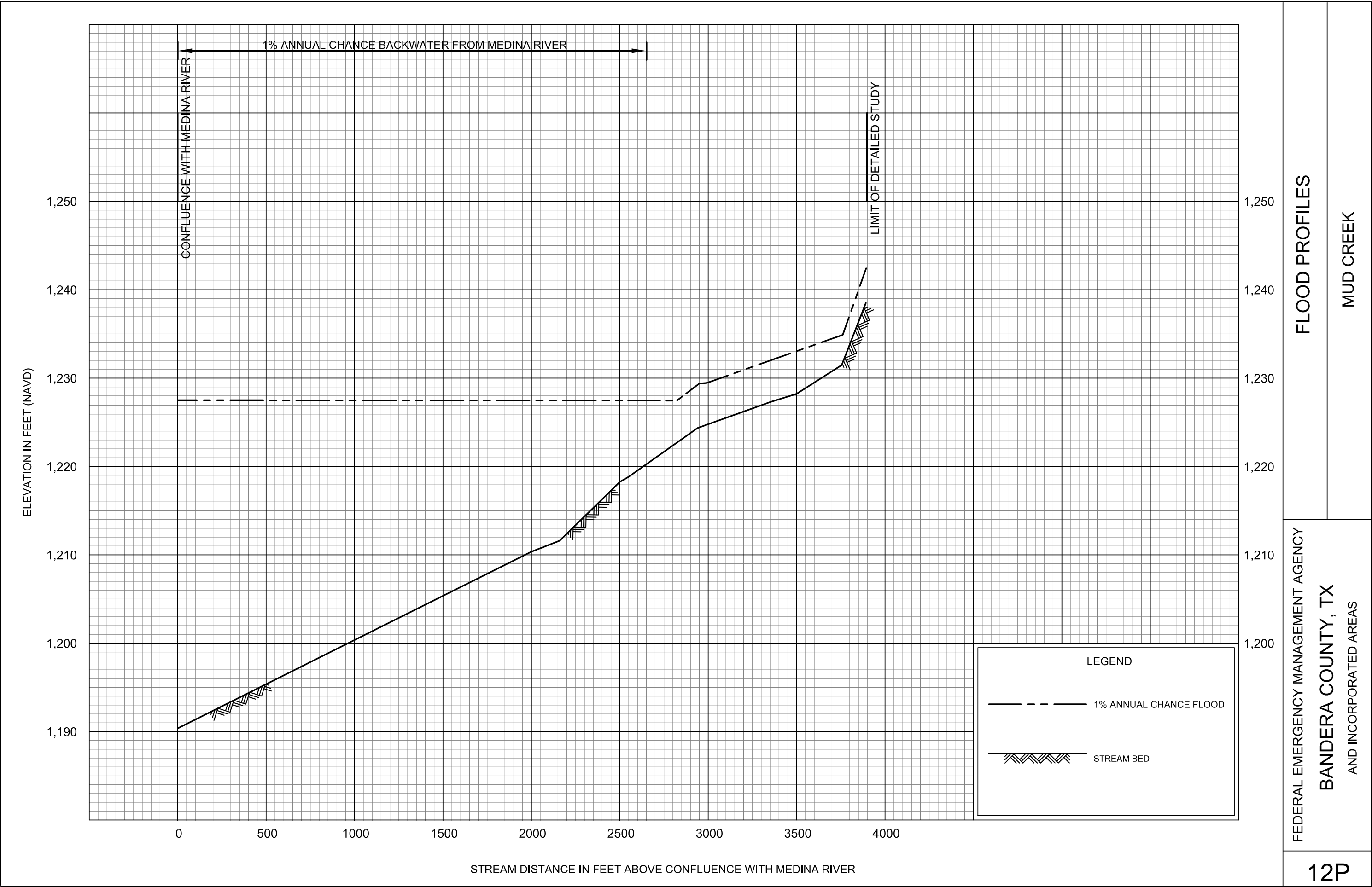


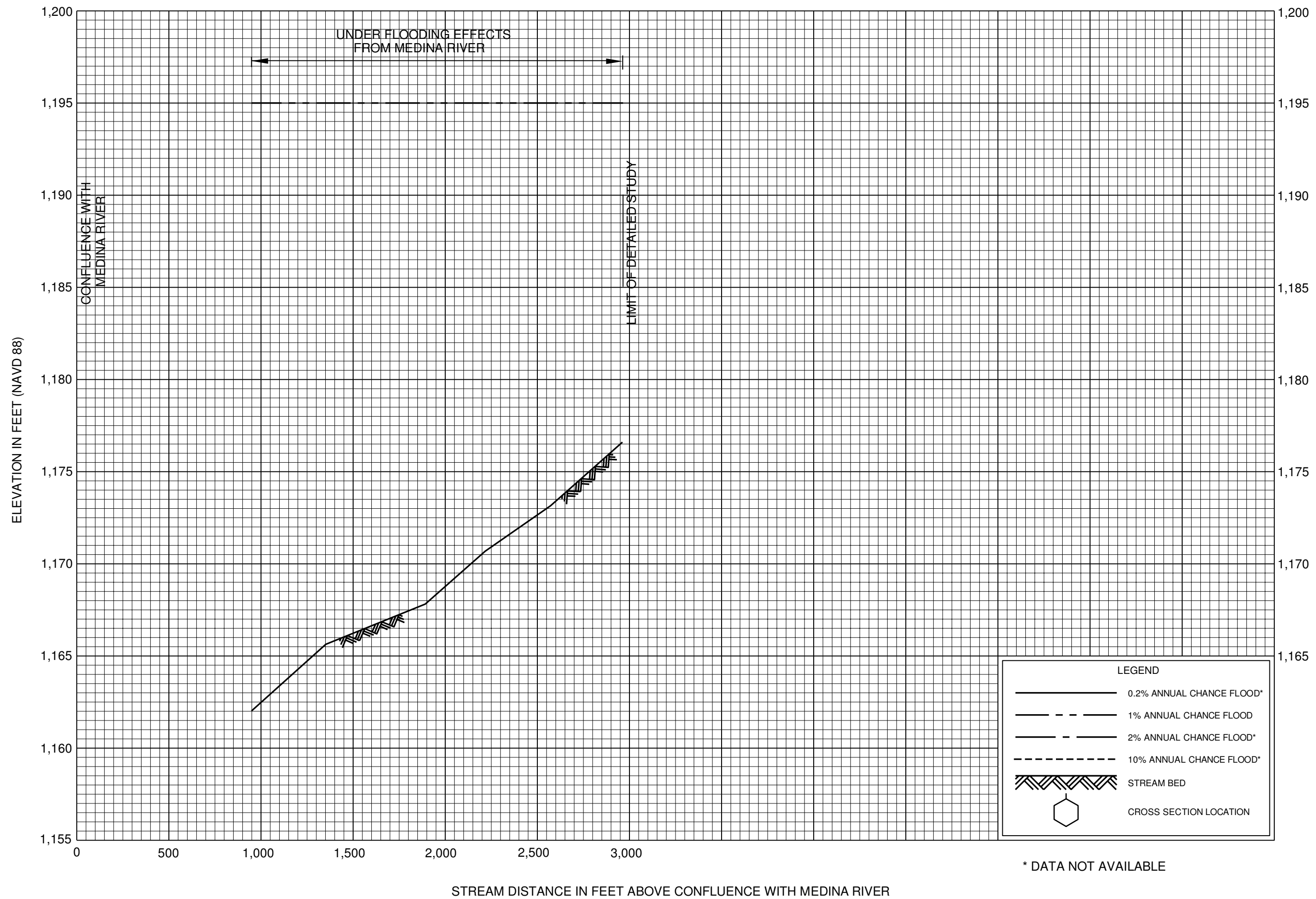




FLOOD PROFILES
MEDINA RIVER (BANDERA)

FEDERAL EMERGENCY MANAGEMENT AGENCY
BANDERA COUNTY, TX
AND INCORPORATED AREAS





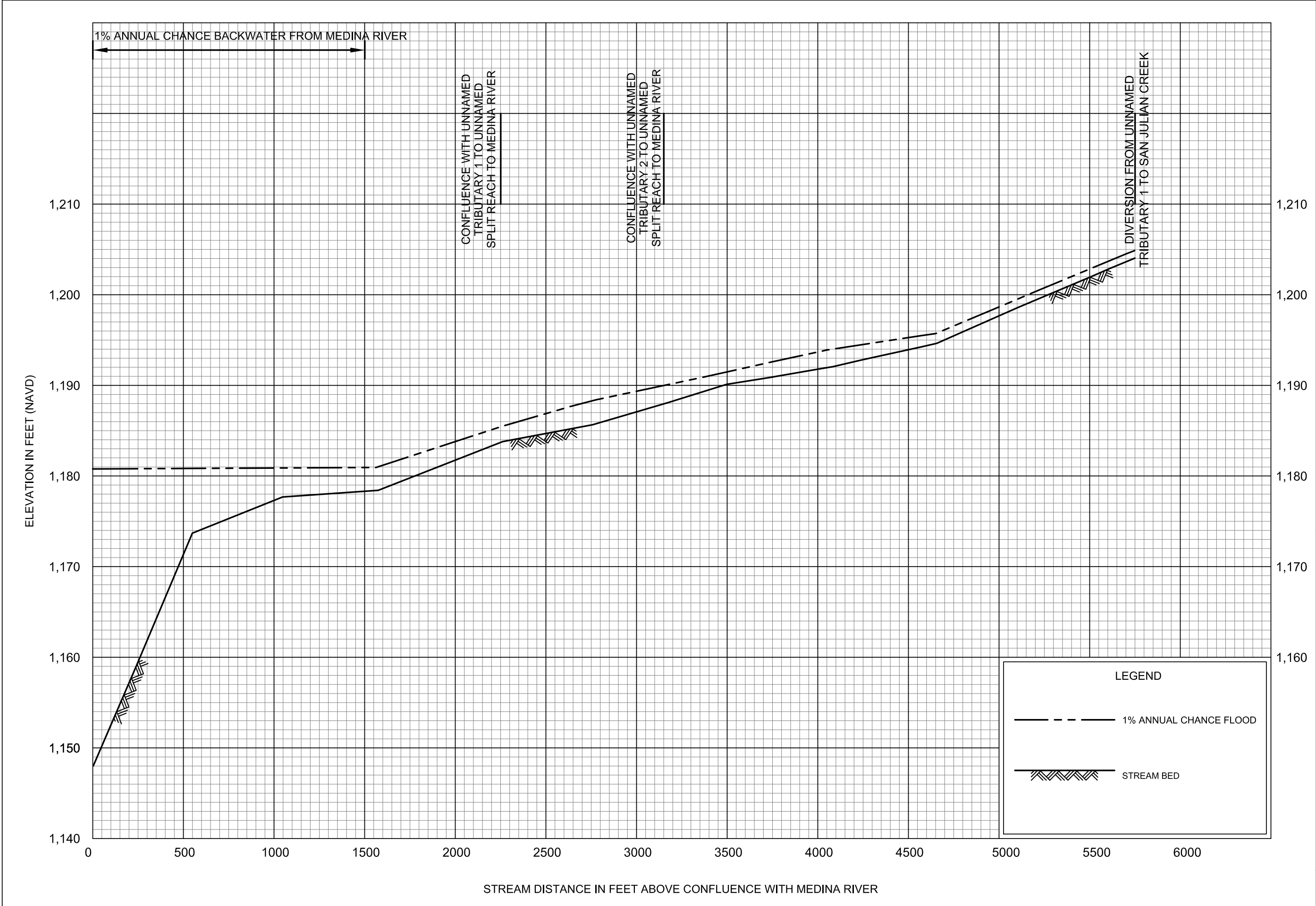
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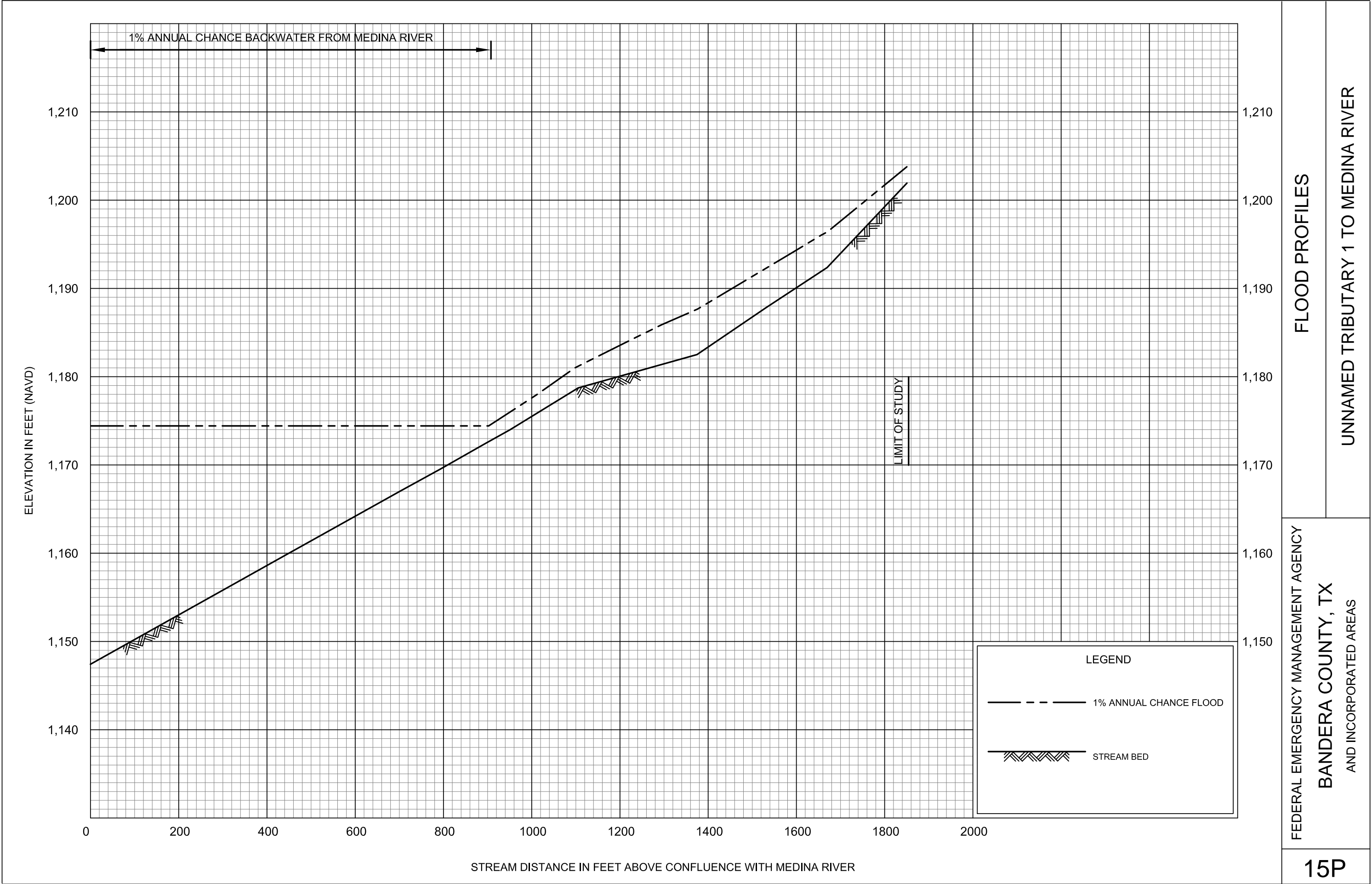
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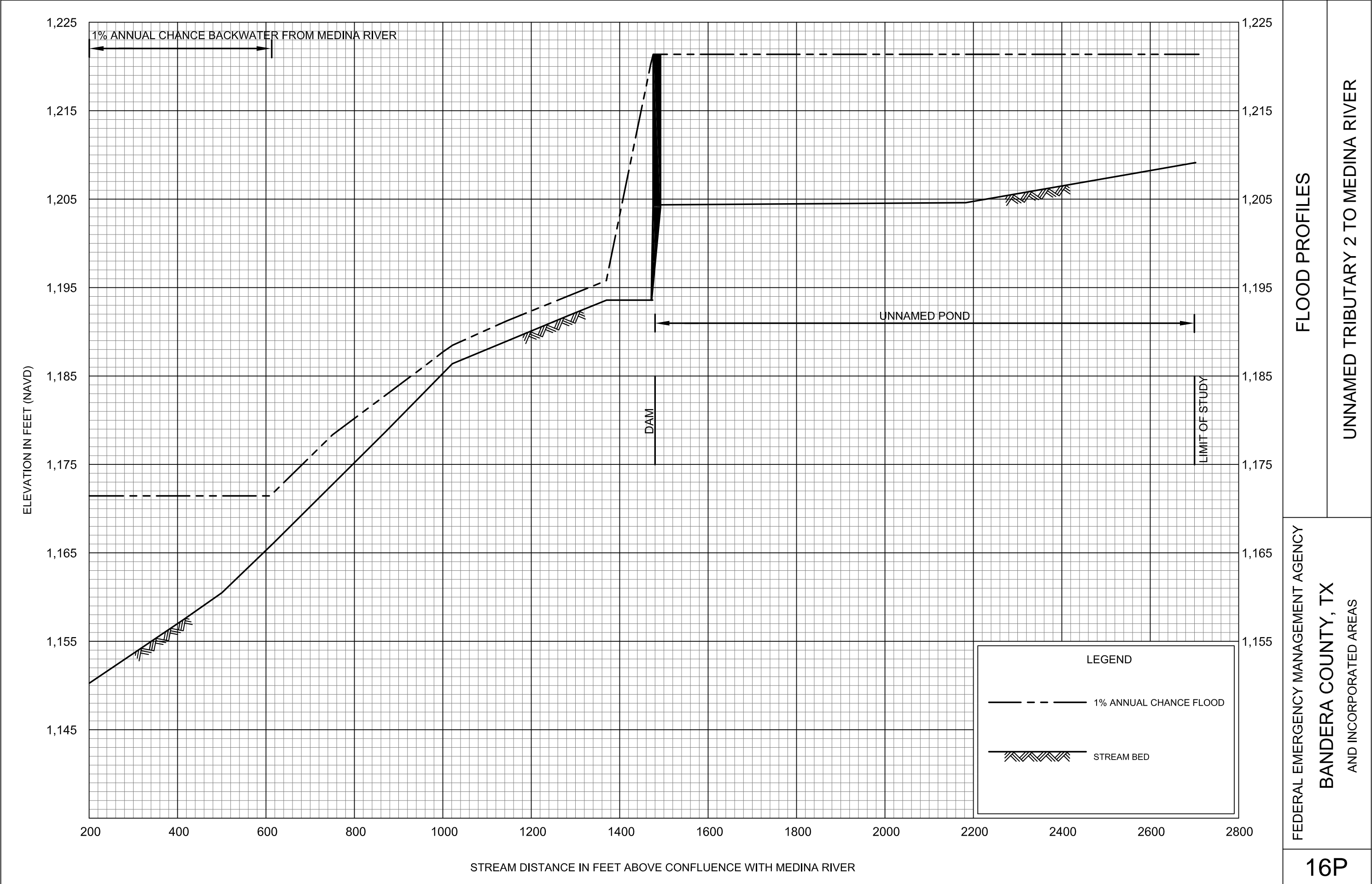
FLOOD PROFILES

SAN JULIAN CREEK

13P







FLOOD PROFILES

UNNAMED TRIBUTARY 2 TO MEDINA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BANDERA COUNTY, TX

AND INCORPORATED AREAS

